

SOURCES OF ISO 9001 QUALITY MANAGEMENT SYSTEM REQUIREMENTS IN MANAGEMENT SCIENCES

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Introduction/background: The success of ISO 9001 quality management system results from its inner integrity and complexity based on rich achievements of management sciences. Thus deeper understanding of particular components and requirements of the standard demands paying attention to their sources deriving from specific concepts and methods of management, which became an inspiration for the international standardization in the area of quality management in organization.

Aim of the paper: The aim of the paper is to identify and interpret the sources of current requirements of ISO 9001 quality management system in the legacy of management sciences.

Materials and methods: The study includes literature review aimed at capturing the substantive and historical connections between the developed concepts and methods of management and the contemporary shape of systemic solutions in the field of quality management expressed by means of ISO 9001 standard.

Results and conclusions: The requirements of ISO 9001 quality management system are characterized by a number of substantive links with the achievements of management sciences developed throughout the history, derived both from classical and modern concepts and methods of management. Originality of this work results from holistic and historical approach to identification and interpretation of sources for changing requirements of the quality management system. The value lies in formulating specific managerial conclusions to improve the evolution, implementation and application of ISO 9001 standard in the future.

Keywords: quality management, ISO 9001, quality management system requirements, management sciences.

1. Introduction

ISO 9001 quality management system is based on the seven principles, including strong focus on customers and their expectations and needs, as well as on top management motivation and involvement, process orientation and continuous improvement. Applying the principles of ISO 9001 facilitates provision of consistent, high-quality products and services to customers,

which in turn ensures numerous business benefits (Bravi, Murmura, and Santos, 2019; Shaikh, and Sohu, 2020).

Despite words of criticism towards certified systems, many production and service organizations still decide to implement such systems. These decisions result not only from customer requirements, but mainly due to the fact that working in standardized systems is an element of competitive advantage for the organization (Wilson, and Campbell, 2020; Tari et al., 2020). The standards provide guidance and tools for companies and organizations that want to reassure customers that their products and services consistently meet both legal and customer requirements and that quality is constantly being improved. The popularity of the quality management system finds reflection in the number of certificates confirming that an organization operates according to the principles of quality management. Currently, about one million companies in almost 200 countries have the ISO 9001 certificate, out of which in 2019 11,460 were the organizations located in Poland (ISO, 2020). The largest number of implementations of ISO 9001 is carried out in the sector of small and medium-sized enterprises (SME) (Walaszczyk, 2018, p. 362).

The success of ISO 9001 quality management system results from its inner integrity and complexity based on rich and proven achievements of management sciences. Thus deeper understanding of particular components and requirements of the standard demands paying attention to their sources deriving from specific concepts and methods of management, which became an inspiration for the international standardization in the area of quality management in organization.

Taking the above into consideration, the aim of the article is to identify and interpret the sources of quality management system ISO 9001 in the legacy of management sciences. The study includes literature review aimed at capturing substantive and historical associations of the developing concepts and methods of management with the current shape of system solutions in the area of quality assurance. In the first part the evolution of ISO 9001 quality management system requirements is presented. After that the authors discuss the influence of management sciences achievements on the shape of modern requirements of quality management system in the area of: organization context, leadership, planning, support, operational activities, assessment of the activities effects and improvement. In “Conclusions” implications of the considerations for theory and practice of management sciences have been formulated. Limitations of the study are also identified.

2. Evolution of the requirements of the ISO 9001 quality management system

The origins of modern quality assurance go back to the industrial revolution initiated in the beginning of the 20th century. In the late 1950s quality began to be perceived systemically, which led to standardization in the field of management systems. The first quality standards were formulated in the USA, in the 1970s. Other countries (such as Canada, Australia and Great Britain) were elaborating their own national standards. The British standard published in 1979 became the benchmark for the creation of the first international quality standard ISO 8402 “Quality management and quality assurance” (Koskela, Tezel, and Patel, 2019). The evolution from perceiving quality only in terms of inspection-control process, through quality assurance, to the aspect of comprehensive quality management, has been reflected in standardized system requirements (Kiran, 2016). The above led, *inter alia*, to the publication in 1987 of ISO 9001, ISO 9002 and ISO 9003 standards describing three quality assurance models (Wolniak, 2018), which turned out to be the turning point in organization management (Hamrol, and Mantura, 2005, p. 175).

Organizations that were increasing the quality of their products and services thanks to the implementation of a quality management system were gaining recognition in the eyes of customers. The ISO 9001 standard “Quality management system. Requirements” was assumed to bring organizations closer to the concept of TQM, introducing them to a higher level of qualitative perception of their activities in all areas. This result was achieved by regarding the changing customer requirements as the overarching ones, with a strong emphasis put on the use of a process approach and on the involvement of top management. In later amendments to the 2008 standard, the provisions concerning some of the requirements were rearranged. Yet the changes to the standard's requirements were referred to as ‘cosmetic’ (Mnich, 2015, p. 84).

The latest amendment, introduced in 2015, includes among the requirements of the quality management system activities based on risk and opportunities, to a greater extent takes into account the organizational context and stakeholders of the organization, emphasizes the role of the organization's manager as the leader, and modifies the requirements for documentation of the management system. All these changes taking place over the years resulted from transformations in the social-economic environment, as well as took into account the increasing competitiveness and shifting expectations of the market.

The requirements of the quality management system are included in seven chapters of the ISO 9001 standard, and they cover the following areas: organizational context, leadership, planning, support, operational activities, assessment of performance and improvement. They have been formulated by the International Organization for the Standardization based on well-established and proven theoretical recommendations formulated by management sciences

and practical experiences gathered by organizations. All those who submit their comments and proposals as to the shape of requirements during the draft phase of the standard elaboration have the possibility to influence the shape of the standard. Representatives of enterprises, experts and scientists can thus influence the final shape of normative regulations by enriching them with the best organizational solutions and rules applied in management theory and practice. As a result the evolving output of management sciences plays important part in formation of the quality management system. The latest edition of the standard, ensuring to organizations more effective and efficient operation, is the result of this evolution (da Fonseca et al., 2019).

The relationships between the output of management sciences and standards are visible already at the level of conceptual foundations. Organizations working in quality management systems carry out activities based on the process management model, in accordance with the PDCA cycle, known as the Deming circle, loop or the continuous improvement cycle (Deming, 1986). The sources of the individual stages of the PDCA cycle can be found in the trend of scientific organization of labour, in particular in the concept of the organized action cycle by H. Le Chatelier (Pietrzak, and Paliszkievicz, 2015; Trenkner, 2017). The specificity of individual requirements of the quality management system also derives from the achievements of management sciences. As a result, it is possible to indicate direct links between current requirements of the standard and specific concepts and methods developed throughout the process of management sciences development, which is presented further on in the article.

3. Influence of the achievements of management sciences on the shape of contemporary requirements of the quality management system

3.1. Organizational context

The requirement included in the ISO 9001:2015 standard (PN-EN ISO 9001:2015-10.P, 2016, p. 4.1) includes defining the organizational context by an organization. It is considered that in order to achieve its intended goals, an organization must counteract the influence of factors disrupting its functioning. This means constant striving to remain in a state of equilibrium in such a way that none of the factors interfering with its activity would disrupt the established course of action. Organizations should therefore identify these factors (positive and negative), as well as monitor and review them. The source of this approach is the principle of inertia/equilibrium (rule of defiance) promoted by a representative of the scientific organization of labour, H. Le Chatelier, which was transferred to the organization science by K. Adamiecki, calling it ‘the law of counteracting’ (Martyniak, 1993, p. 23). According to the rule if a system in the equilibrium state is subjected to a specific factor, the system will counteract in order to reduce this stimulus (Lachiewicz, and Matejun, 2020, p. 94).

According to the standard, the organizational context also includes the establishment of processes carried out in or on behalf of an organization. A process is defined here as a set of determined and planned, interrelated or interacting activities that use inputs to deliver an intended result. Thus understood process approach recommends holistic consideration of processes as interrelated activities, the identification of which allows for a better understanding of value creation.

The sources of process approach can be identified already in the administrative field of management sciences. Within its framework, the so-called 'Fayol's passerelle' (Isomura, 2020, p. 48) has been identified, which allows for direct contact of employees from various organizational divisions on operational matters, without the need for the superiors' interference each time. The concept of the process is also grounded in the concept of the value chain by M. Porter (1985), in which the implementation of individual activities increases the value of involvement in the creation or delivery of a product/service to the market. It is so because each subsequent action performed in the process adds to the value of the previous action effect.

This approach originates also from the ideas of process organization and process management (Wąchol, 2018). The development of these concepts entailed a shift from structural to process thinking, which created a new management philosophy (Bitkowska, 2009). Its essence lies in the organization's openness to changes and the departure from the linear view of the organization in favour of the correct flow of resources and competences, in order to ultimately receive a product or a service. The implementation of business process reengineering in organizations is an expression of the shift towards the process approach (Hamer, and Champy, 1993). The key features of this concept, such as the fundamental rethinking of the company's organizational system, radical redesigning of the organization in the operational area and a clear improvement in the results achieved by treating the process as the key dimension of the activities, bringing by itself an added value (Zimmiewicz, 2014, pp. 101-102), are nowadays critical to the success of the organization in the implementation and application of the requirements of the ISO 9001 quality management system.

3.2. Leadership

Another requirement of the standard draws attention to leadership and commitment of the top management in activities for quality assurance. The activities include focusing on increasing the satisfaction of internal and external customers, establishment and dissemination of quality policy, as well as ensuring that the responsibilities and powers of the staff performing important roles are properly assigned, communicated and understood in the organization. This model assigns a leading role to the leadership, placing it in the centre of all activities and processes in the organization related to the quality assurance system (Walaszczyk, and Polak-Sopinska, 2019).

Leadership has always been a very important foundation for the development of management sciences. In this context, the leadership is defined as influencing the behaviour of other people by establishing new patterns of acting and providing information about their modification, thus playing the key role in implementing changes in organization (Hussain et al., 2018). An efficient leader is able to select effective employees and closest associates so that they support the leader in implementation of the vision and goals (Mnich, & Wiśniewski, 2019). At individual management levels the leaders that would be appointed should integrate and motivate their teams and resolve contentious issues that arise while performing activities (Mazur, & Gołaś, 2010, p. 49). Therefore, it was no accident in the evolution of the normative requirements of quality management systems that the requirement of responsibility was changed to that of leadership and commitment of the top management. The mere bearing of responsibility is not enough to effectively implement changes and improve organization.

The sources of this requirement are derived from the concept of changing role of managerial staff, already developed within the framework of scientific work organization. The representative of this period, F.W. Taylor, under the principles of scientific management, emphasized the role of close cooperation between the leaders and workers in the work process ensuring proper performance of tasks. He also proposed almost equal division of labour and responsibilities between leaders and workers in the work process, with leaders focusing on tasks for which they are better prepared than their personnel (Taylor, 2008, p. 27).

The importance of leadership was also emphasized in the domain of administration and in the theory of bureaucracy. H. Fayol (1972), when formulating 14 principles of management, drew attention to such dimensions of leadership as motivating and building staff commitment, as well as appropriate treatment of employees, characterized by a combination of goodwill and justice. It was also important for him to focus on the initiative of his subordinates, which means the freedom to propose new ideas and the possibility to implement them, as well as to focus on teamwork and harmony, building a sense of belonging and supporting staff involvement in teamwork.

As part of this trend, the direct ties between leadership and authority in the organization were also emphasized, an example of which is the concept of bureaucracy by M. Weber (1972). He distinguished charismatic authority, based on the subordinates' faith in the uniqueness of the leader, their unusual or model qualities, as well as on the legitimacy of the norms or order defined by that person. The motives of subordination are related here to idealism and most often have a moral dimension, which enables triggering strong commitment among employees and achieving above-average results.

The sources of this requirement can be also identified in the achievements in the field of interpersonal relations school. An example can be the Y theory of by D. McGregor (2006), in which he emphasized that active interaction between leaders and employees take place in organizations. The character of these relationships should be inspiring and supportive, so that all members believe that the goals of the organization and their implementation are of personal

importance to them. According to the assumptions, such an attitude triggered self-directivity, creativity and self-control of the staff, supported by searching for and taking responsibility for undertaken and implemented actions.

At a later time, the Full Range of Leadership Model (Kirkbride, 2006) was developed basing on these achievements. The model underlines the role of transactional and transformational leadership. Specific features of transformational leadership, such as: emphasizing the importance of internal motivation and positive development of employees, supporting high moral and ethical standards, promoting cooperation and harmony, and encouraging subordinates to act freely and to go beyond their own interests for the common benefit (Bass, and Riggio, 2006) are currently important as guidelines for implementation of ISO 9001 quality management system in organizations.

3.3. Planning

In the next chapter, the standard introduces the requirement of planning, which includes the analysis of risks and chances determining functioning of the organization, designating, communicating and monitoring the achievement of measurable quality management goals for relevant functions, levels and organizational processes, as well as the principles of introducing changes in the quality management system. The importance of this requirement stems from the role of planning in management sciences. Planning is treated as the first function of the management process, and it refers to formulating of the main goal, and then of specific objectives that the organization will pursue within the set time and with the use of specific resources (Szymańska, 2020, p. 167). The process of goals planning and determining the methods to achieve them is complex. One should take into account not only the identified goals of the social subsystem of the organization, but also the goals of entities from the immediate and further environment and then unify them so that they are consistent with each other (Hamrol, and Mantura, 2005, p. 72). Therefore the process of planning through setting goals and determining the methods of their implementation appears repeatedly in various trends in management.

The sources of this requirement are derived from the achievements of the field of scientific work organization, within which H. Emerson (2003, pp. 59-370) formulated the twelve principles of efficiency. The first of them, the principle of a clearly defined goal, indicates the need to set a specific course of action for the organization, which must be known to all members. The activities of the entire staff should be focused on its implementation. H. Emerson, as a consultant in the field of work efficiency improvement, had practical managerial experience. Under the principles developed by him, also the second guideline, i.e. the principle of common sense, is vital for planning. It indicates the possibility of taking actions useful and necessary for achieving the goal, while allowing for the elimination of possible obstacles. This principle relates directly to the activity dimension in the function of planning, which involves defining the ways and means by which organizational goals are to be achieved.

Planning is furthermore directly related to the principle of establishing the order of action, which consists not only in precise determination of the course of work, but also in documenting these activities, which will also support the achievement of the goals. The requirement is also derived from the achievements of the administrative field, including the managerial functions described by H. Fayol, which have become the foundation of the contemporary understanding of the process of managerial activities. The first of these functions was predicting, that incorporated identification of events that could occur in the future and developing appropriate action programs in response (Lachiewicz, and Matejun, 2020, p. 99).

The important role of goal setting and business planning was also emphasized in the system approach. H. Leavitt (1972) identified the subsystem of goals and values as one of the key elements of the diamond organizational model, paying attention to its direct, dynamic and multidirectional relationships with other subsystems: psychosocial, structural and technical, as well as with the organizational environment. Within the framework of the principles of the systemic direction (Piotrowski, 2010, pp. 697-699), goal-setting was preferred to defining detailed action programs in order to trigger creativity and independence of the organization members, at the same time leading to the formation of self-regulation and self-control mechanisms. Moreover, attention was drawn to the equifinality of the organization, expressing its ability to achieve the same goals (results) in different ways, starting from different initial states (Bielski, 2002, pp. 35-36).

The sources of this requirement are also derived from the rich achievements of strategic management, under which the emphasis is put on formulating main goals of an activity, continuous and dynamic monitoring of the environment and resources of the organization, as well as determining the methods and means necessary to achieve the set goals. As a result of these activities, the organization creates and implements a strategy, in other words, a program that defines the main goals of its activities and the methods of their implementation (Romanowska, 2009, p. 16). The planning nature of the strategy was emphasized by H. Mintzberg (1987), who treated it, *inter alia*, as a plan, i.e. a consciously intended and prepared direction of long-term action, a kind of signpost for the organization, setting the directions for its development and building its competitiveness in the future. As a result, an understanding of strategy and strategic planning that includes, among others:

- plan, template,
- the best way to use organization resources and competences,
- capability of identifying opportunities quickly and efficiently,
- ability to make choices under conditions of risk and uncertainty,

which are aimed at achieving the assigned goals (Zakrzewska-Bielawska, 2020, p. 190), is currently becoming an important requirement for the implementation of the ISO 9001 quality management system in organizations.

3.4. Support

Another requirement refers to the provision of support for quality management system in terms of resources, development of staff competences and awareness, assurance of communication and documented information. The foreground of these provisions is occupied by the identification and provision of human and infrastructural resources (both physical and intangible: information and knowledge), indispensable for establishment, implementation, maintenance and continuous improvement of the quality management system.

The origins of this requirement derive primarily from the resource-based view, marked with the importance of orchestrating tangible and intangible resources in order to generate exceptional value, translating into enhancing competitive advantage and achieving above-average market results (Sigismund Huff et al., 2011, pp. 45-47). In compliance with this approach, the resource potential of an organization is expressed not so much by the range of resources but, above all, by the degree of development of their strategic framework identified in VRIN framework, including: value, rareness, imperfect imitability and non-substitutability (Barney, 1991). Over the years, this model was being developed to the form of VRIO framework, additionally highlighting the need for a proper resource organization (Barney, and Hesterly, 2015).

The key resources, according to the resource-based view, include intangible resources, which is consistent with the requirement of the standard, in which the leading role is assigned to competences and human resources. From the beginning, human resources were among the key areas of interest for management sciences, starting from the trend of the scientific organization of work. Their appropriate selection, and then training and improvement, so that each employee could be assigned a job, in which their physical and mental qualifications would enable achieving maximum efficiency, were a valuable component of the work system according to F.W. Taylor (2008, p. 27). The discussed standard indicates similar requirements. They include:

- defining and assurance of proper selection and necessary competence of the personnel responsible for the effects of operation and efficiency of the quality management system,
- developing and consolidating the awareness of the staff in relation to significant quality objectives and personal contribution to the implementation of the strategic goals of the organization.

The above requirements indicate the necessity to maintain high motivation among employees involved and responsible for quality assurance in the organization. The standard also requires the maintenance of a social and physical work environment necessary for the functioning of processes and the achievement of compliance of products and services. In this aspect, special attention is paid to social and psychological factors, introduced into the requirements together with the amendment to the standard in 2015. These factors are based on

relations between employees, mutual support in the implementation of entrusted tasks and the sense of belonging to a team and awareness of working towards a common goal.

The sources of this requirement originate from the achievements of the behavioural school and the human relations field, whose representatives emphasized the dominant role of psychosocial factors, especially the so-called informal organization, appropriate work atmosphere, trust in the management-subordinate relations, proper communication between the organizational levels and the participation of personnel in the company's activities (Lachiewicz, and Matejun, 2020, p. 102). As an example of the classic concept of motivation, one can point out A. Maslow's (1943) hierarchy of needs, according to which a person is motivated to meet needs in a specific order, which at the same time constitutes the structure of individual motivators for each member of the organization. The important role of the work environment and social and psychological factors was confirmed, among others, by the results of the research by E. Mayo (1933). They show that the effects of work depend on feelings and mental states related to the work environment and atmosphere and on interpersonal relationships in groups, also in the informal ones.

The new recommendation of the analysed standard also applies to ensuring, maintaining and sharing the knowledge necessary for the functioning of processes and for achieving compliance of products and services. The source of this requirement is derived from the concept of knowledge management (Nonaka, 1991; Nonaka, and Takeuchi, 1995), aimed at achieving goals by locating, acquiring, developing, disseminating, using knowledge and preserving knowledge in an organization (Probst, Raub, and Romhardt, 2000). This concept assumes the dynamic nature of knowledge, while providing a framework for the conversion of tacit and explicit knowledge into organizational knowledge through socialization, externalization, combination, and internalization.

The discussed standard also introduces the requirement of efficient and effective internal and external communication regarding the quality management system. Communication is the process of providing information and disseminating knowledge, which aims to bring about understanding for decisions among the personnel and development of their loyalty and identification with the organization (Walecka, 2020, p. 457). The guidelines of the quality management system require documenting of the strategic goals and operational activities of the organization, adequately to their scope and specificity. Historically, the requirements for documenting activities derive from the achievements of the trend of scientific organization of labour. H. Emerson (2003, pp. 205-240), in his concept of twelve principles of efficiency, emphasized the importance of written communication and the need to conduct reporting and reports on the implementation of tasks, which should be reliable, immediate, accurate and up-to-date. This approach is fully consistent with the modern requirements of the timeliness, availability and integrity of the quality management system documentation.

3.5. Operational activities

In the next chapter, the standard introduces the requirements for manufacturing products and provision of services by organizations. They include processes related to the design and manufacturing of products and the provision of services, communication with customers and supervision over processes, products and services supplied from the outside.

In particular, the provisions introduce a requirement to establish, implement and maintain a design process, including planning, as well as the definition of input, output and supervisory activities. In addition, the organization should produce and provide services under supervised conditions. The source of these requirements are, above all, the rich achievements of the operations management concept, which was initiated as part of the trend of scientific organization of labour. One of the first examples of a synergistic connection between design and strict supervision over production processes is the system of work organization and management of a large industrial enterprise that was developed by H. Ford (Kurnal, 1970, p. 44). He proved that concentration on the design and control stage increases the chances of success in mass production, with simultaneous progressive cost reduction and product quality improvement. As part of the further development of the operations management concept, more and more attention was paid to production planning, design and management of production processes, facilities planning, management and maintenance, as well as to inventory management and control (Krajewski, Malhorta, and Ritzman, 2018), which is now reflected in the provisions of the quality management standard.

The sources of the requirements in the field of communication with customer derive from the rich legacy of marketing, in particular from the development of marketing communication (Wiktor, 2013) and relationship marketing (Otto, 2004). The concept of marketing communication assumes the use of specific sources and channels of communication in order to effectively transmit messages from senders to recipients. Its purpose is to stimulate attention and to evoke specific reactions of recipients to the signals and stimuli sent, as well as to acquire and process information and feedback in order to improve the offer and streamline the organization's operations. These features successfully meet the requirements of the standard, among others, in the field of communicating messages to customers and obtaining feedback on products and services from the customers. Relationship marketing, on the other hand, is focused on building specific, long-term relationships with customers that support customer satisfaction and loyalty. In this context, the relationship marketing is a source of knowledge about customers' expectations and needs, necessary to ensure that the requirements for products and services offered to customers are met under the quality management system.

In accordance with the provisions of the standard, as part of operational activities, organizations should also ensure compliance with the requirements of all processes, products and services provided by external suppliers, and necessary for proper functioning of the organization. For this purpose, it is necessary to establish and apply criteria for the qualification, selection and evaluation of suppliers, as well as procedures for monitoring and evaluation of deliveries of products and services. Originally, this requirement only covered the purchasing process of all necessary elements to produce a product or provide a service. In this situation, all external services necessary for the functioning of the organization were not supervised. Currently, the content of the requirement refers directly to the concept of outsourcing, which is defined as the supervision over activities transferred from the internal structure of the company to be implemented by external entities (Trocki, 2001, p. 13). Outsourcing enables the use of competences and skills of specialized external partners (service companies) to perform tasks (processes or functions) that are important for continuity of the economic activity (Matejun, 2011).

3.6. Assessment of the effects of action

Next, the standard introduces the requirement to monitor, measure, analyse and evaluate the effects of the quality management system operation, as well as the requirement of internal audit and management review. These activities consist in systematic examination of processes, products and services that are characterized by variability. Thanks to this, it is possible to identify all deviations from the standard and all non-conformities, and to take appropriate corrective actions (Łunarski, 2012, p. 217). In the first place, the organization should adopt an adequate form and scope of monitoring and measuring each process and its impact on manufacturing a product/provision of a service compliant with the requirements (Walaszczyk, and Błaszczuk, 2013, p. 90). Further on these data are a subject to analysis, with the purpose to assess the suitability and effectiveness of the quality management system, primarily taking into account customer satisfaction and compliance of the actions with the requirements (Łunarski, 2012, pp. 277-279).

The requirements of the standard in the field of monitoring, measurement and analysis derive from the achievements of the quantitative school in management sciences. Under this approach mathematical and statistical methods were applied to determine interactions and relationships between multiple factors. The changes in the values of these variables and to the analyses performed with the use of IT tools enabled quick determination of the effects of these changes, which accordingly provided the basis for taking managerial decisions (Lachiewicz, and Matejun, 2020, pp. 101-108).

Nowadays, monitoring, measurements, analyses and evaluation of the effects of conducted activities are performed mainly within the trend of performance management. This concept is a set of analytical and managerial processes and activities supported by technology, that enable organizations to define goals, measure their achievement, and then – based on the results of the assessment – make specific decisions ensuring the achievement of goals in an efficient and effective manner (Cardy, and Leonard, 2014). Both, the basic features of this concept, as well as the analytical tools used within it, including in particular key performance indicators (Parmenter, 2020) and balanced scorecard (Kaplan, and Norton, 1992), are currently important components of the ISO 9001 quality management system requirements in organizations.

Internal audit and management review are required to ensure the suitability, adequacy and effectiveness of the quality management system and its compliance with the strategic directions of the organization's activities. They are carried out in order to identify weak points in the functioning of the organization and to discover overlooked sources of potential for development (Mnich, 2016). Moreover, they bring added value in the form of diagnostic information about the course of processes in the organization and the directions of their improvement (Molenda, 2014, p. 21). The results of internal audits constitute the necessary input data for the management review, which includes a comparative analysis of the performance of individual processes.

The sources of this requirement are derived from the field of administrative management, within which H. Fayol drew attention to the function of control, by which he understood the analysis and assessment of compliance with the relevant regulations, orders and objectives (Kieżun, 1977, p. 75). The concept of benchmarking should be indicated as a source of comparative data assessment. The concept stands for comparing one's own solutions with the best, model solutions in a given field in order to improve the organization performance (Lachiewicz, and Matejun, 2020, p. 117). The requirements for audit and management review are primarily derived from internal process benchmarking (Adamik, 2015, p. 53-54), where comparison is made within the processes implemented in a given organization. In the auditing process, thanks to the measurement and analysis of the results of each of the implemented processes, it is possible to confirm the degree of compliance with the requirements, at the same time drawing conclusions for further improvement of the quality management system.

3.7. Improvement

The last chapter of the standard indicates the requirement to improve all activities of the organization in order to meet the requirements and increase customers' satisfaction, as well as to prepare the organization to meet their future needs and expectations. The improvement process is related to the company's ability to correct, prevent and reduce undesirable actions and effects and to prevent the products and services inconsistent with the assumed requirements from occurring (Łunarski, 2012, p. 277). In this way, the organization can continuously improve the suitability, adequacy and effectiveness of the quality management system.

The improvement element occurs in almost all classic management trends, referring both to the workplace (direction of scientific work organization), administrative solutions (administrative field) or relations between members of the organization (direction of interpersonal relations).

Still the interest in this issue increased predominantly together with the development of the research on organization learning curves (Cochran, 1968; Dutton, Thomas, and Butler, 1984). It was proven under the research that the increase of production experience provided the employee with an opportunity for incremental learning, which lead to expected cost reduction per a product unit in time. The improvement element was also highlighted in the concept of incremental process innovation. For example, W. Abernathy and P. Townsend (1975), while analysing the sources of acceleration of the innovation creation and dissemination, stress that process innovativeness is supported by 3 types of changes:

- rationalization of processes, which includes the development of predictability of production and introducing automation into production processes, aimed at the increase in the volume of production with standardized specifications. As a result, in production processes, automatics is intermingled with manual operations, whereas innovations increasingly result from the development of new technology;
- system-based technological development, ensuring stabilization of processes through joining together rationalization of processes and application of more and more advanced production technologies. Under the development, process engineering is placed in focus, including the issues of inventory control, process balance and optimal equipment selection. Also relations with suppliers, who have to perform process tasks that are either uncontrolled or difficult to automate, undergo transformation;
- process/product realignment, which is concentrated on further increase of productivity through: material inputs improvements, changed process technology and labour skills, larger process scale, and a tailoring of product characteristics. This change assures further possibilities of development with the assumption that production processes are being adjusted to the conditions of the external environment. Hence the additional requirement is to consider the pressure from the environment in the process of incremental improvement.

Still the sources of the standard requirements in the area of improvement derive mainly from the development of the concept of quality management. This challenge is noticed by W.E. Deming (1986) in his concept known as 14 Points of Attention for Managers (also: 14 Points for Management, the Deming Management Method). Already in point 1 he assigns the commitment for the organization to create constancy of purpose toward improvement of product and service, with the aim to become competitive, to stay in business and to provide jobs. In point 5 he indicates the necessity of constant and endless improvement of systems of production and service provision for the purpose of improvement of quality, productivity and cost reduction. It is also important to introduce modern methods of

professional development (point 6) and motivate the staff to continuous development through training and self-improvement (point 13). The final requirement is to engage all members of the organization in the processes of transformation and quality improvement (point 14).

In this approach commitment to quality comes from the top management, and continuous improvement in production processes should be followed by each and every member of the organization. Improvement is not a single effort but a continuous journey that businesses should follow to reduce waste and to improve quality. It is the role and responsibility of the management to keep an eye on constant improvement in design, product, process, training, supervising, maintenance, etc. (Agrawal, 2019, p. 1163).

Among specific tools for quality management aimed at organizational improvement one can enumerate: Quality Circles, Kaizen (Albayrak, and Kececi, 2020) or Kansei Engineering (Zuo and Wang, 2020). Constant improvement is also the key element of quality improvement methodologies, such as (Sokovic, Pavletic, and Pipan, 2010): PDCA cycle, EFQM Excellence Model, RADAR Matrix (Results, Approach, Deploy, Assess and Refine), DMAIC (Define, Measure, Analyse, Improve, and Control), or DFSS (Design for Six Sigma). In contemporary times this rich output of the concept of quality management in the area of continuous improvement is most fully expressed through the practice of implementation of quality management systems accordant with ISO 9001 standard.

4. Conclusions

The considerations presented in the article indicate that a number of substantive links with historically shaped legacy of management sciences can be found in all contemporary requirements of ISO 9001 quality management system. At the same time the sources of normative requirements derive both, from classic theories of management (among others the field of scientific organization of work, administrative, school of interpersonal relations) and modern management concepts and methods (among others strategic management, reengineering, benchmarking, outsourcing, relationship marketing). Identified linkages between following ISO 9001 requirements and concepts/methods of management are presented in Table 1.

Table 1.*Linkages between ISO 9001 requirements and concepts/methods of management*

ISO 9001 requirements	Related concepts and methods of management	
	classic	modern
Organizational context	<ul style="list-style-type: none"> – scientific management (e.g. principle of inertia/equilibrium), – administrative management (e.g. Fayol's passerelle). 	<ul style="list-style-type: none"> – value chain, – process organization and process management (e.g. business process reengineering).
Leadership	<ul style="list-style-type: none"> – principles of scientific management, – administrative management, – theory of bureaucracy, – interpersonal relations school. 	<ul style="list-style-type: none"> – leadership (e.g. full range of leadership model, transactional leadership, transformational leadership).
Planning	<ul style="list-style-type: none"> – scientific management (e.g. twelve principles of efficiency), – administrative management (e.g. managerial functions concept), – system approach. 	<ul style="list-style-type: none"> – strategic management (e.g. strategy, strategic planning).
Support	<ul style="list-style-type: none"> – scientific management (e.g. work system by F.W. Taylor), – behavioural school (e.g. motivation theories). 	<ul style="list-style-type: none"> – resource-based view (e.g. VRIN, VRIO frameworks), – knowledge management.
Operational activities	<ul style="list-style-type: none"> – scientific management (e.g. work system by H. Ford). 	<ul style="list-style-type: none"> – production management (e.g. production planning, production processes, maintenance, inventory and control management), – marketing (e.g. marketing communication, relationship marketing), – outsourcing.
Performance assessment	<ul style="list-style-type: none"> – quantitative school, – administrative management. 	<ul style="list-style-type: none"> – performance management (e.g. key performance indicators, balanced scorecard), – benchmarking.
Improvement	<ul style="list-style-type: none"> – scientific management, – administrative management, – interpersonal relations school. 	<ul style="list-style-type: none"> – organization learning curves, – incremental process innovation, – quality management (e.g. 14 Points of attention for managers, Quality Circles, Kaizen, PDCA cycle)

Source: prepared by authors on the basis of study results.

Knowledge of the aforementioned conceptual foundations and their associations with the requirements of the standard enables more comprehensive understanding of quality management philosophy and ISO standard by managers. The understanding is useful already at the stage of taking decision on implementation of a quality management system, facilitating the assessment of the accordance of the concepts and methods of management applied in a company with the requirements of the standard. The understanding plays vital role at the stage of implementation and maintenance of the system, enabling flexible adjustment of particular managerial solutions with simultaneous assurance of their efficiency and linkage to the system of managing the whole organization and its particular functions. A deeper understanding of the conceptual bases for the standard requirements also reduces the barriers faced by organizations during implementation and application of quality management systems, enabling achieving better outcomes resulting from their application.

The dynamics of the influence of management sciences on the character of current requirements also indicates the necessity for further changes in ISO 9001 quality management system together with the development of new concepts and methods of management. Yet the rate of introducing changes and developing updates responding to the dynamic development of management theory and practice poses a challenge. This point is highlighted, among others, by R.D. Reid (2020), who states that, taking into consideration the acceleration in the rate of changes, organizations may not be able to await the update of ISO standards, which lag current practices by at least three to five years due to the time required to get them to market. In his opinion, greater representation of new technologies and automation can be expected in management systems in the future. That applies in particular to solutions in robotics, and Internet of Things. The changes will be rather evolutionary than revolutionary in character, and they might evolve towards integrating the various applicable standards into one overall management system.

Still, a quantitative prognostic analysis carried out by M. Ikram, Q. Zhang and R. Sroufe (2020) for 6 selected countries in the period 2018-2026 indicates that the number of ISO certifications will continue to increase, although with a varied dynamics. The authors predict that China and India will become the leaders in the area of quality management systems implementation. They will be followed by Italy, Germany, Japan, and then the United Kingdom. On the other hand, the results of the research carried out by M. Ćwiklicki, K. Pilch and M. Żabiński (2019) on the sample of 2150 local government units indicate that only 37,9% of the units with the experience of the ISO 9001, were willing to continue using the solution. The reason for that situation has been the increase of interest in alternate management improvement solutions (mainly Common Assessment Framework – CAF and Planning Institutional Development – PRI), as well as introducing in 2009 the obligation to conduct management control. Thus the future of ISO 9001 quality management system remains uncertain. This future will depend mainly on the capabilities of introducing changes in normative guidelines that will keep up with the dynamic development of the theory and practice of management sciences with the benefit for organizations.

Considering the obtained results and formulated conclusions, the limitations of the study should be taken into account (Geletkanycz, and Tepper, 2012). They mainly derive from the subjective selection of the concept and method of management considered as conceptual foundations and sources of quality management system ISO 9001 development. Certainly, the study does not take into account all the concepts and methods of management, which became an inspiration for the international standardization in the area of quality management. However, a journey through the classical and modern history of management sciences allows in this case a deeper perception for the philosophy and practice of ISO 9001 quality management system by managers.

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