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SHAPING QUALITY IN INTEGRATED MANAGEMENT SYSTEMS

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Purpose: The objective of this paper is to analyse the concept of integrating the quality management system with other management systems, including those related to the environment, energy, information security, occupational health and safety, and complaints handling. In addition, the paper identifies the key benefits arising from the integration of these systems.
Design/methodology/approach: The article is of theoretical nature and its subject matter is focused on the interpretation of the concept of quality taking into account such current aspects as: environmental protection and energy management and work safety. The work reviews the literature related to this issue.
Findings: The paper indicates management systems whose integration within ISO, according to the authors, would constitute an optimal system ensuring that current aspects related to quality management are taken into account.
Originality/value: The article proposes a perspective on understanding the concept of quality, taking into account environmental and health and safety aspects throughout the entire product life cycle.
Keywords: quality, environment, OHSMS, integrated management systems, product life cycle.
Category of the paper: Literature review.

1. Introduction

Issues concerning product quality and quality management have gained, and continue to gain, in significance, as activities undertaken in this field exert either direct or indirect influence on various components of quality of life. These include, among others, the quality of the surrounding natural environment and the quality of the working environment, which ensures comfort and safety during work (Ejds, Kobylińska, Lulewicz-Sas, 20212). Standardisation is increasingly being employed as a management tool within these domains. The principal organisation responsible for the development of international standards in this area is the

International Standards Organisation (ISO). In 1987, ISO published for the first time a family of standards for systematic quality assurance, designated as 9001, 9002, and 9003. The subsequent development of this standardisation framework, along with the inclusion of other management aspects, facilitated the integration of individual management systems. Interest in the integration of management systems increased following the emergence of the environmental management system, with a marked growth observed after the introduction of the British standard BS 8800 in 1996, which addressed occupational health and safety management (Łańcucki, 2001). The primary objective of integrating these areas has been, and continues to be, the improvement and optimisation of processes carried out both within the organisation and of external processes operating within the framework of the respective management systems. Currently, depending on the operational objectives of a given organisation, its management approach, or its defined vision, the integration processes it undertakes may encompass a wide range of management aspects, most of which have already been reflected in the ISO standards family.

2. The Concept of Quality

To date, the concept of quality has not been unequivocally defined. The ambiguity of this term arises from its complexity and, consequently, the diversity of its interpretations, that is reflected in the available literature. Since ancient times, successive aspects of the notion of quality have been identified and framed in philosophical, technical, economic, or marketing categories. The multitude of attempts to define quality underscores its relevance in virtually every sphere of life. Among the most well-known definitions of quality are the following (Bielawa, 2011):

- quality is the judgement of the evaluator, subjectively dependent on experience – Plato (philosophical perspective),
- quality is excellence – the Stagirite (philosophical perspective),
- quality is that by virtue of which things are determined in a certain way – Aristotle (philosophical perspective),
- quality is a property (attribute) of an object – Cicero (philosophical perspective),
- the quality which can be named is not its true attribute – Lao Tzu (philosophical approach),
- quality is excellence, perfection of workmanship – Lao Tzu (philosophical perspective),
- primary quality, inherent in the object, and secondary quality emitted by the object – Descartes (philosophical perspective),
- quality is a set of characteristics of a distinct fragment of subjectively perceived objective reality – Kant (philosophical perspective),

- the quality of an industrial product is the totality of properties determining its fitness for use in accordance with its intended purpose – Dubovikov (technical perspective),
- quality is the set of physical, chemical, biological, etc., characteristics that define a given product and distinguish it from others – Oyrzanowski (technical perspective),
- the technical quality of a product is determined by its physicochemical properties and is a function of the material characteristics of the product – Chwieduk (technical perspective),
- quality is the set of physical characteristics by which a product is expected to satisfy specific human needs – Miszewski (technical perspective),
- quality is the product's ability to satisfy certain needs of consumers and users – Oyrzanowski (economic perspective),
- product quality is the degree to which a specific need is satisfied under precisely defined conditions of use – Lwow (economic perspective),
- production quality, considered from an economic standpoint, is the degree of intensity of a set of features interrelated with utility value, expressed through the reliability, efficiency, durability, modernity, and aesthetics of goods that meet human needs – Kostrzewa (economic perspective),
- production quality is the degree to which a product is capable of satisfying user needs, determined by its utility and manufacturing properties – Cholewicka-Goździk (economic perspective),
- quality (of services) is the performance that meets or exceeds the buyer's expectations – Zeithaml, Parasuraman, Berry (marketing perspective).

Recognition of customer (buyer) needs, or more generally the degree to which a given object (product, process, organisation, or phenomenon) is aligned with the expectations of the experiencing entity, has also been reflected in many other attempts to define quality (Urbaniak, 2004; Bagiński, 2000):

- the degree to which a specific product satisfies the needs of a particular buyer – J.M. Juran,
- the anticipated degree of uniformity and reliability at the lowest possible cost and in accordance with market requirements – W.E. Deming,
- conformance to requirements – Ph. Crosby,
- the totality of characteristics of a product or service in the areas of marketing, design, manufacturing, and maintenance, by which the used products and services meet customer expectations – A.V. Feigenbaum,
- meeting current and future customer needs – J. Oakland,
- the degree to which a set of inherent characteristics (of a product, system, or process) fulfils requirements (of customers and other interested parties) – ISO 9000.

Since the beginning of the twentieth century, along with the evolution of the concept of quality, there has also been a development in the ways in which it is shaped. Technical inspection, quality control, quality assurance, and ultimately modern comprehensive quality management represent successive stages in the evolution of quality management systems (Ligarski, 2010). Today, the notion of product quality no longer pertains solely to technical or manufacturing elements but also encompasses market-related and environmental aspects. Ensuring the desired properties and characteristics of a product should take into account the culture of work, the quality of relationships with the external environment, and social responsibility. Such an approach requires a different perspective on the process of creating product quality, replacing it with quality management, understood as control over quality (Lisiecka, 2002). Control over quality therefore constitutes the next likely stage in quality management – Figure 1.

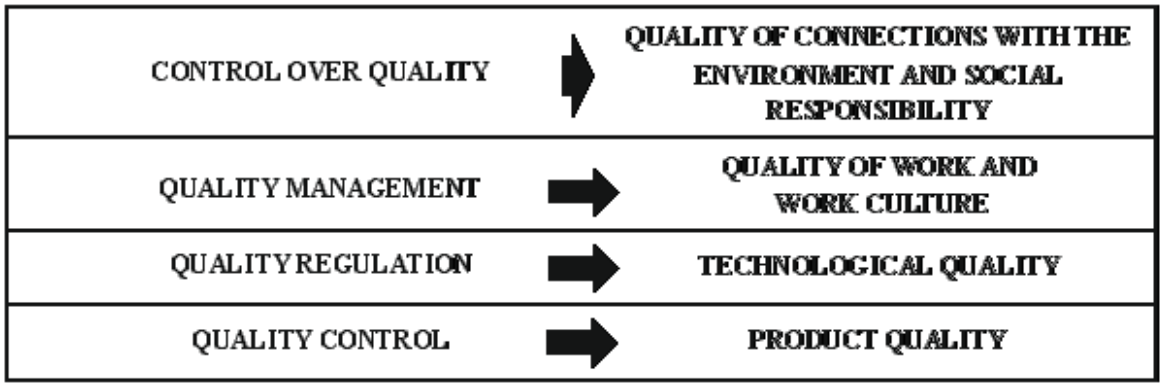

Figure 1. Evolution of the notion of quality and the ways in which it is shaped.

Source: Own elaboration based on (Ligarski, 2010).

Both the concept of quality and the methods of its formation will continue to evolve alongside the development of manufacturing and management systems. On the one hand, some researchers argue that there is no need to search for new concepts and that existing solutions should be better understood and applied – the so-called "back to the roots" approach. On the other hand, it is observed that quality as a discipline will become even more "ubiquitous" (Ligarski, 2010). It appears that there is no definitive answer in this regard, as the definition of the concept of quality should be distinguished from the methods by which it is shaped. The Stagirite stated that quality is excellence, a view echoed by Taguchi, for whom quality represented a loss passed on to society by the product, calculated from the moment the product was dispatched (Łańcucki, Kowalska, Łuczak, 1995). In both cases, we are dealing with the notion of an ideal product, which, depending on the perspective adopted, may be ascribed primary attributes (properties) as well as all aspects related to social responsibility (e.g. work culture, environmental protection). Approaching such excellence will require the adoption of appropriate quality management and formation systems, which can and should adapt to the current level of technology and market requirements.

3. Quality in the Product Life Cycle

As mentioned in the previous section, the concept of quality is ambiguous, ubiquitous, and difficult to define unequivocally. One of the reasons for this lies in its varying interpretations, which are dependent on environmental factors. Even the perception of quality in the relationship between the manufacturer and the customer is not aligned. In the case of the former, the emphasis is placed on profitability (e.g. price, cost, quantity, market share) and competitiveness (e.g. product improvement, competitive advantage), while in the latter, the primary concern is functional needs (e.g. usability characteristics or availability) (Bielawa, 2011). A reconciliation of both parties' needs can be found in the work of D.A. Garvin, who describes quality using seven dimensions (Mroczko, 2011):

- performance – the internal characteristics of the object,
- reliability – the ability to function without failure over a specified period of time,
- serviceability – acceptability, ease of use and maintenance,
- conformance – the degree to which the product meets established standards,
- durability – the ability to make use of the product over a defined operational period,
- features – secondary product characteristics, such as how the product is perceived in the market,
- perceived quality – product branding, and the reputation of the supplier or manufacturer.

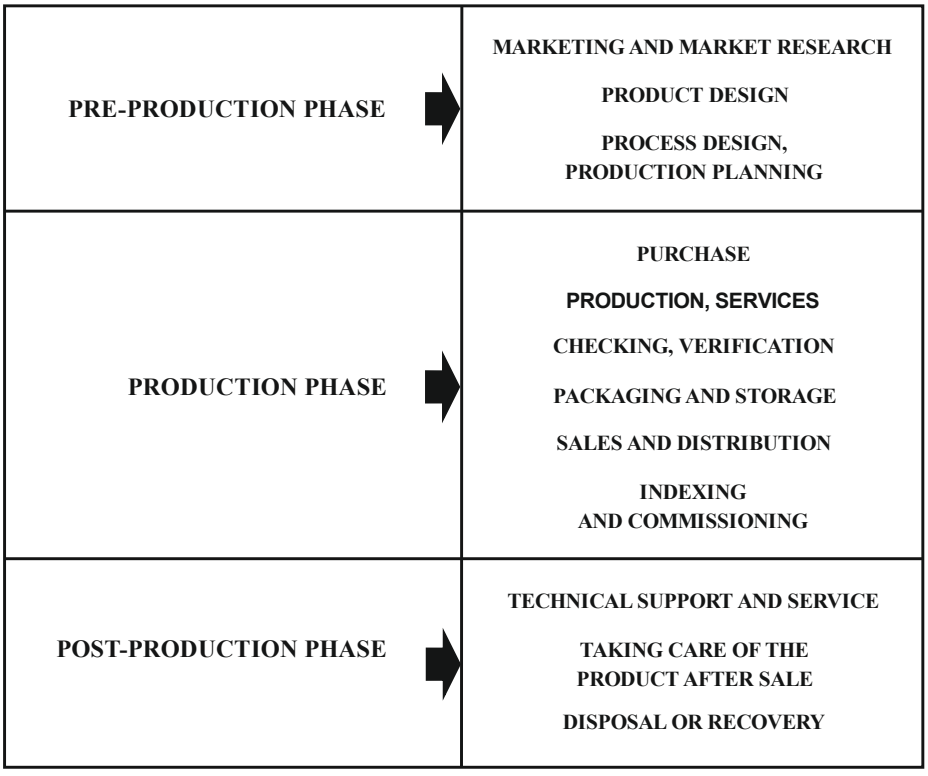

Figure 2. Quality in the product life cycle.

Source: Based on (Hamrol, Mantura, 2002).

Nevertheless, regardless of the point of view adopted, quality should relate to the entire life cycle of the product – Figure 2. This concept, already recognised in ISO 9001-4:1994 and later in the subject literature (Hamrol, 2023; Hamrol, Mantura, 2002), is not in conflict with the process-oriented approach currently favoured. However, it emphasises the role of the manufacturer, whose decisions, particularly at the design stage, are of decisive importance for subsequent production and the perception of the product.

4. Integration of Quality with Other Management Systems

From the early stages of its definition in ISO standards, the product life cycle has incorporated elements of environmental protection (disposal or recovery). The subsequent development of standardisation systems, particularly within the framework of the International Organization for Standardization, has expanded to encompass nearly the entire globe (173 countries), with numerous (847) technical committees and subcommittees continuously engaged in updating and developing new standards. As a result of these efforts, a total of 25,801 standards are currently dedicated to virtually all aspects of technology and management (www.iso.org/about, 2025). The diversity of standard families has led many companies to integrate them into a single management system. Such an approach is generally more effective in achieving policy objectives than one based on separate systems (www.iso.org.pl, 2025). Depending on the specific nature of the industry, an enterprise implements an integrated system consisting of various subsystems. Typically, the foundation of such systems is the quality management system based on the ISO 9000 family of standards (it was built in such a way as to enable easy implementation of subsequent systems), which is most commonly integrated with the environmental management system ISO 14000 and the occupational health and safety management system ISO 45000. It appears that such a basic level of integration should also encompass the information security management system ISO 27000, the energy management system ISO 50000, and the guidelines for complaints handling in organisations, ISO 10002 – Figure 3.

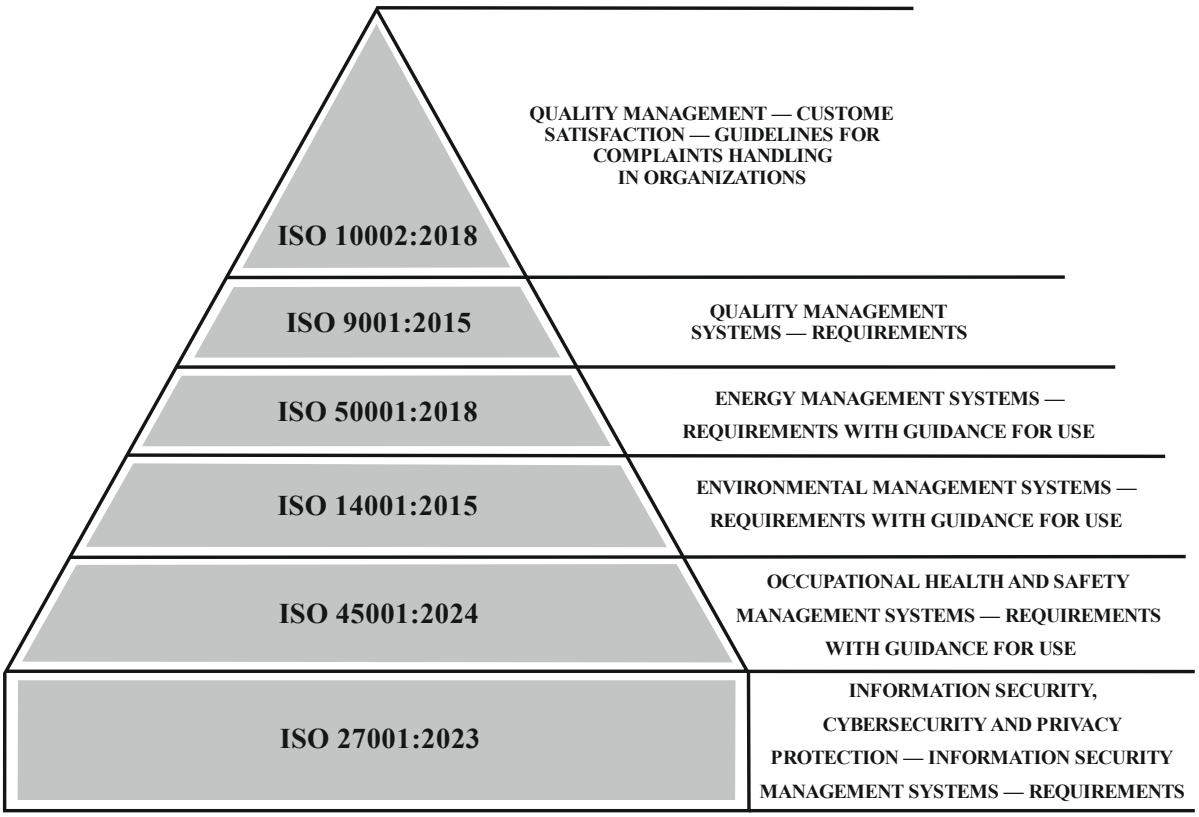

Figure 3. Triangle of relationships between the fundamental aspects of an integrated management system.

Source: Own study.

The foundation of all systems is information, and it appears evident that in all the matters discussed, information constitutes the essence of monitoring and analysing the production process. Recommendations to base decisions solely on facts and properly documented information are present in almost every ISO standard. At the same time, given that one of the priorities in the information security management standards (ISO 27000) is to ensure the accuracy and completeness of information and the methods of its processing (www.ssw-consulting.pl, 2025), efforts should be made to ensure that at least elements of these regulations are also incorporated into each area of the integrated management system. This becomes particularly important in today's reality, where the overabundance of information requires verification and organisation, as the knowledge built upon it directly shapes management practices. An equally important component in this aspect is complaints handling (ISO 10002), which constitutes a specific form of interaction with the customer. Every feedback message from the market, whether resulting from nonconformities revealed during use that are attributable to the manufacturer or those arising from user-related causes, constitutes a valuable source of information directly related to the sphere of quality.

Another proposed standard in the integrated management system is ISO 45000, which addresses occupational health and safety management. The fundamental legal act regulating, among other things, occupational health and safety issues in Poland is the Labour Code. The bodies responsible for supervising and monitoring compliance with labour law as well as

occupational hygiene and working environment regulations are primarily the State Labour Inspection (PIP) and the State Sanitary Inspectorate (PIS) (Urbaniak, 2004). Lower-level normative acts include ministerial regulations. One such regulation (https://isap.sejm.gov.pl, 2025) contains guidelines concerning the statistical accident at work card – Dz.U. Journal of Laws of 2022, item 2750. The information collected from these cards forms a nationwide database that supports the implementation of preventive policies in this area. For statistical purposes, enterprises use measurement tools referred to as indicators. The most commonly used ones include (Kordecka, 2008): accident frequency rate, accident severity rate, and accident absenteeism rate. ISO 45000 goes beyond legal requirements by promoting, among other things, increased employee involvement, improved effectiveness of undertaken actions, and measures related to risks and opportunities. It also recommends monitoring incidents that do not result in injury or health issues, referred to as so-called near misses. The registration of such events within the framework of preventive actions is a vital element in preventing serious accidents. As early as 1931, H. W. Heinrich developed the so-called accident triangle, which illustrates the relationship between non-injury incidents and actual accidents – Figure 4.

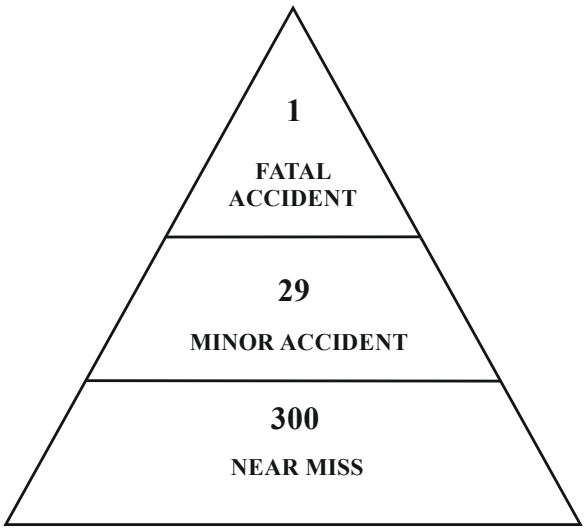

Figure 4. Heinrich's accident triangle.

Source: Based on (www.imansys.com/pl, 2025).

Similar correlations were identified by Bird (600 – near misses, 30 – accidents, 10 – serious accidents, 1 – fatal accident) and by DuPont (30,000 – unsafe behaviours, 3000 – first aid cases, 300 – minor accidents, 30 – serious accidents, 1 – fatal accident) (www.imansys.com/pl, 2025). These triangles are most often used as reference frameworks, since individual companies, taking into account the specific nature of their operations, develop their own classification systems. For instance, a retail sector enterprise registered all incidents in five categories (Skuza, Ogórek, 2017):

- near-miss without material loss,
- near-miss with material loss,
- first aid only,

- first aid and medical consultation (without sick leave),
- most severe accidents (death, disability).

The discussed issues of occupational health and safety pertain to employees, not to users of a given product. In the case of both industrial and consumer products, the safety of their use is regulated by relevant national or EU legislation and certification systems that authorise the product for market release.

Environmental management is another crucial aspect of an integrated management system. The ISO 14000 series of standards reflect the pro-environmental orientation of enterprises by supporting organisations in activities aimed at improving environmental performance. These standards directly refer to sustainable development and the product life cycle, recommending supervision of or influence over the processes of design, manufacturing, distribution, consumption, and disposal (ISO 14001:2015). The intent of the standard also includes responding to changes in environmental conditions in alignment with societal and economic needs, including those expressed in legal requirements. Polish legislation in this domain is based on three primary acts: the Environmental Protection Law, the Water Law, and the Waste Act. These laws, along with associated regulations and implemented EU directives, define the direction of environmental policy. Naturally, legal regulations set a minimum required level for pro-environmental activities, whereas the standard encourages organisations to undertake broader efforts in this area. The EU's policy aimed at achieving climate neutrality places particular emphasis on energy sources and their utilisation. Published on 15 June 2011, ISO 50001 focuses on cost reduction, lowering greenhouse gas emissions, and improving energy efficiency. This aspect has, to some extent, been separated from the broader environmental domain and has thus become another potential element for integration within the management system. However, it may be assumed that organisations which already have an implemented environmental management system and choose to adopt ISO 50001 will structure their integrated system in such a way that the requirements of ISO 14001 remain the leading framework, with a specific extension targeting energy management. Such an approach gains particular importance in energy-intensive industries (e.g. steelworks), where the economic factor is additionally significant. Of course, in the case of other organisations, broadly understood ecology, similarly to quality, is increasingly becoming a means of distinguishing their identity and is, more and more often, a necessary but insufficient condition for achieving success in a highly competitive market. A common practice, for example, is the labelling of everyday devices with energy efficiency ratings (ranging from class A to G). Unfortunately, these labels only apply to the consumption phase, and it may theoretically turn out that a class A device, when considering the pre-production, production, and post-production phases, has "used" significantly more energy than a supposedly less efficient class C device. To avoid such situations, a proper interpretation of the ISO 50001 standard should address the entire product life cycle, allowing for an accurate energy balance of the goods offered on the market.

As mentioned earlier, the integration of ISO systems is not an exceptional process. Certified international organizations conduct cyclical training dedicated to authorized representatives or internal auditors of integrated management systems (www.tuvsud.com/pl, 2025). Many companies have already implemented such systems and although there are no official statistics (www.iso.org, 2025), as indicated by random market research (Skuza, 2020), out of 78 surveyed companies, 42 declared having an integrated management system (ISO 4500, ISO 27000 – 14 cases). There is also an increasing belief that even a minimal level of integration is becoming a necessity for the efficient functioning of a given organization (Kafel, Sikora. 2011). The positive impact of using such systems on the level of management effectiveness is also confirmed by the results of empirical research (Cierpioł, Wasikiewicz-Rusnak, 2021).

5. Conclusion

The review of the source literature showed that the definitions found in the subject literature reflect, to varying degrees, the contemporary understanding of quality. A universal definition of this concept (e.g. ideal, perfection, fulfilment of needs) shifts the perception of quality towards the recipient. Each of us, therefore, may individually determine the set of properties that, in our view, should be attributed to a product. This applies to both the manufacturer and the customer. Quality is thus a subjective notion, as a given product may be assessed differently depending on the manufacturer or the recipient. Perceptual differences may occur within a single group of consumers – e.g. varying emphasis on different features – as well as between distinct groups – e.g. different target markets. It is therefore the responsibility of the manufacturer to take customer needs into account in such a way as to meet the expectations of as many as possible. This necessity has been recognised in the ISO standards, in which customer orientation and the importance of customer relations constitute fundamental elements of the quality management system. Although most consumers (excluding the industrial market) do not pay attention to information regarding the manufacturer's compliance with ISO system requirements (www.jakosc.biz, 2025), they nevertheless recognise the benefits of such compliance. Consumers expect, among other things, a guarantee that the offered products and services are safe, reliable, and of high quality. The current international ISO standard system offers standards and procedures enabling the achievement of intended objectives in all defined areas. However, this is only possible if a unified organizational strategy is implemented that also takes into account pro-quality activities in individual areas.

The components of the integrated management system proposed in this paper traditionally include standards related to quality, environmental protection, and occupational health and safety management. However, they have been additionally supplemented with standards

concerning energy, information, and complaints handling. The authors believe that all these aspects should now constitute the foundation of contemporary understanding and management of quality. The application of the related requirements should also extend to all stages of the product life cycle, that is, from the initial idea or concept of the product to its disposal. Quality perceived in this way, in line for example with Taguchi's definition, would impose on manufacturers the obligation to adopt a broader perspective on the processes carried out within the enterprise. For instance, the energy balance should be considered across the pre-production, production, and post-production phases.

The ongoing industrial revolution (Industry 4.0; 5.0) and the growing environmental awareness of societies will undoubtedly compel manufacturers to revise their current competitive strategies. Issues such as repairability, recycling, disposal, or the source of energy used in production have already, in many cases, become the subject of legal or market regulation. Despite technological advancement, humans remain at the core of quality. Humans still participate, to a greater or lesser extent, in the production process and are always the end customer. It is also the human who, in a competitive market, indirectly determines the specific attributes of a product and, increasingly, makes purchasing decisions based not only on the product's functional characteristics.

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