

# Innovation management systems - reality and perspectives

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**Abstract:** Innovations require professional knowledge augmented by personal skills, creativity being the most frequently cited. It is a common misconception that standards limit creativity. The recent trends in management system standards prove that they can be used as best practices in order to improve organizational performance in various domains. The seven parts of CEN/TS 16555 are the precursor of the ISO 56000 series of standards for innovation management systems. The article provides a chronological review of these standards, their relation to the United Nations' sustainable development goals (SDGs) and the way they can provide benefits for the organizations.

**Keywords:** INNOVATION MANAGEMENT SYSTEMS, ISO 56002, ISO 56000 SERIES, UN SDG, INTELLECTUAL PROPERTY, TECHNOLOGY TRANSFER.

## 1. Introduction

'Eureka!' is the popular exclamation used to express the joy from making a discovery or an innovation. Scientists and researchers do not rely on chance and use their knowledge and experience to explore unique phenomena. Furthermore, the scientists of today have to consider global challenges, technological developments and ethical issues in their research. In fact, innovation is not just a buzzword. It should be characterized by the value it brings to society.

By the definition given in ISO 9000, innovation is 'new or changed object realizing or redistributing value' [1]. This definition already makes a clear distinction between innovation and improvement, the latter one being an 'activity to enhance performance'. In other words, improvements enhance the effectiveness of processes, whereas innovations also enhance their efficiency. Generally, innovations are expected to bring significant effect, to have high return on investment (ROI) and add value.

In order to achieve this, the activities resulting in innovation need to be managed. As is the case with the vast majority of ISO management system standards, this is done by implementing the Plan – Do – Check – Act (PDCA) cycle [2].

The popularity of the PDCA cycle to a large extent is as a result from its penetration in all ISO 9001 quality management systems [3]. According to the latest ISO Survey [4] conducted in September 2020 more than 1,2 million organizations have successfully developed, implemented and maintain quality management systems conforming to ISO 9001:2015. This undisputed leader is followed by ISO 14001 with 312580 valid certificates for 487950 sites [5]. Third in this ranking is ISO/IEC 27001 for information management systems [6], followed closely by ISO 45001 for occupational health and safety management systems [7]. This fourth place is partly due to the fact that this standard is published only recently and practically is the ISO answer to the need to adopt BS OHSAS 18001 as an internationally recognized best practice.

The quality professionals from around the world have made numerous efforts to introduce 'innovation management' as a core discipline in quality management. Fig. 1 presents a graph showing the results of a query, performed on the website of the 'Quality Progress' Magazine of the American Society for Quality. It can be said that innovation management was a significant topic right from the first version of ISO 9001, published back in 1987.



**Fig. 1** Innovation management articles published in the ASQ Quality Progress Magazine (1986 – 2021).

The spikes on the graph actually represent a reaction of the innovation community to the new edition of ISO 9001 in that specific time period.

2013 is the year when the European Committee for Standardization (CEN), and more specifically- its Technical Committee CEN/TC 389 has published its technical specifications in the domain of innovation management. By 2015, the CEN/TS 16555 series included 7 standards ranging from requirements for an innovation management system, through creativity management and innovation thinking, to more specific standards for innovation management assessment and intellectual property management [8].

This context has set the stage for the International Organization for Standardization (ISO) to develop a standard, or rather, a series of standards dealing with innovation management.

## 2. Discussion

### 2.1 Relationship between innovation management and quality management system standards

When the ISO 9000 series are discussed, usually this set of standards includes:

- ISO 9000:2015,
- ISO 9001:2015,
- ISO 9002:2016, and
- ISO 9004:2018.

Below is a list which is customized for the topic of this paper.

ISO 9000:2015 provides the definition for the term 'innovation'. In its clause presenting the quality management principles, 'innovation' is specifically addressed in the key benefits from implementing improvements.

As a consequence, Clause 10 'Improvement', more precisely the note to Clause 10.1, and potentially Clause 10.3 'Continual improvement' suggest that innovations are one of the possibilities to implement improvements in organizations.

ISO 9002:2016 [9] has identical structure to ISO 9001 and provides more detailed guidelines on how to apply the requirements of ISO 9001. Here also, Clauses 10.1 and 10.3 deal with innovations.

ISO 9004:2018 [10] stands out from the abovementioned standards. With its guidance for achieving sustained success by organizations ISO 9004 goes beyond the concept of conformity to requirements. It can serve as a roadmap and a basis for defining action plans which will improve not only the effectiveness, but also the efficiency of the quality management system. The structure of this standard differs from the clauses of ISO 9001 and ISO 9002.

Innovation has a specially devoted clause (11.4) covering general guidelines, application, timing and risk. Clause 11.4.1 points the

attention to the fact that changes in the context of the organization, be it internal or external, as well as changes in the needs, expectations and requirements of interested parties may be causes provoking innovation initiatives. In addition to promoting innovative thinking and providing the resources for supporting innovation initiatives, the organization is advised to establish and maintain processes for innovation management. Thus, ISO 9004 can be seen as the precursor of the ISO 56000 series of standards.

Clause 11.4.2 deals with the implementation of innovations at all levels of the organization. This would require changes in processes, products and services, in the technologies applied by the organization, in the organization's structure, business model and its management system. The latter can be integrated with the ISO 56000 series as well.

The timing of implementing innovations by following specific action plans is presented in Clause 11.4.3. The implementation of innovations should take into consideration relevant opportunities and risks, time horizons, and the way in which innovations support its strategic direction.

In addition to the widely used evaluation methods such as reviews, audits and monitoring of Key Performance Indicators (KPIs), ISO 9004 devotes more than half of its page volume to a self-assessment tool. For each of the clauses, this tool specifies maturity criteria divided into 5 levels. The lowest level- Level 1, signifies chaotic and ad hoc reactions, Level 2- some management of the process but lack of a system, Level 3- evidence of a well-maintained quality management system. The more advanced levels- Level 4 and Level 5, can serve as opportunities for improvement of 'ordinary' organizations. At maturity level 4 the organizations can be considered as industry leaders in the specified criteria. Maturity level 5 denotes world class performance. These criteria can be modified to better suit the specific context of the organization. One should be mindful that the maturity levels defined in ISO 9004 also evolve. For example, the high levels in the previous edition of the standard- ISO 9004:2009, are now considered as 'basic/musts' or 'performance/wants' if we make an analogy with Noriaki Kano's model for product development and customer satisfaction. The 'attractive/exciters' characteristics are where an innovative organization should aim at. For example, Maturity Level 5 for innovations can be described by the following:

- Innovations take into consideration possible changes in the organization's context;
- Preventive action plans are in place in order to mitigate the risks that generally accompany innovation initiatives;
- Innovations are applied at all levels of the organization.

## 2.2 Innovation management system and supporting standards

The foundations for innovation management, laid out in the ISO 9000 series and in the CEN/TS 16555 series of standards have produced a sequence of initiatives undertaken by Technical Committee ISO/TC 279 'Innovation management'. In 2019, three innovation management standards have been published:

- The guidance standard for innovation management systems- ISO 56002 [11];
- The standard with tools and methods for innovation partnership- ISO 56003 [12];
- And the standard with guidance on how to assess innovation management- ISO 56004 [13].

The approach of ISO/TC 279 is notably different from the established practice in most management system standards. For example, in the case of quality management systems, the requirements standard- ISO 9001 is published, and then it is followed by ISO 9002 with the guidance on how to apply the requirements. The position of ISO/TC 279 on this issue can be summarized by an analogy with a best practice in our daily lives: 'monitor the route people take, and then pave the path'. The proof of this fact is that the standard with

requirements for an innovation management system- ISO 56001 is still at a very early stage of its development by the end of 2020 [14].

In 2020, two more standards have been published:

- The fundamentals, principles and vocabulary in ISO 56000 [15], and
- A key standard with guidance for the tools and methods for managing intellectual property- ISO 56005 [16].

This document can serve as a best practice for all organizations dealing with intellectual property (IP)- patent offices, research centres, technology transfer offices, and other interested parties. The ISO 56000 series considers intellectual property and an integral part of innovation management. The strategy, policy, objectives and processes for intellectual property management are integrated with the strategic innovation efforts and with the overall management system of the organization.

The University of Ruse 'Angel Kanchev' has developed its strategy, policy, objectives and processes for innovation management and IP management. The Technology Transfer and Intellectual Property Centre (TTIPC) is in the process of implementing its internal innovation management system and be prepared for certifying this system when the requirements standard (ISO 56001) is published. In 2020, the TTIPC has published its first innovation portfolio which contains the valid IP products and focusses on the new applications and registrations of patents, utility models, designs and trademarks. The innovation portfolio is being used as a tool to raise awareness amongst all relevant interested parties, both internally and externally. This portfolio is based on a database of intellectual products which is maintained and updated regularly by the TTIPC. The information is cloud-based and can be accessed anytime, anywhere by authorized staff.

Innovation management is intrinsically involved with change management. The dynamic world we live in is characterized by volatility, uncertainty, complexity and ambiguity (VUCA). The abbreviation VUCA stands for the rapid change of the organization's context, the many unknowns it needs to consider in its operations, the complicated interplay of various influencing factors and the many possible interpretations of facts. ISO 56006 is meant to help organizations achieve their business objectives by navigating the VUCA environment [17]. This guidance for tools and methods for strategic intelligence management can help decision-makers with meticulously collected, summarized and presented information, converted into specific knowledge about the innovation trends. ISO 56003 is in the last step before becoming a Final Draft International Standard (FDIS) and the innovation professionals are really looking forward to its official publication.

The international community eagerly expects in 2021 the development and/or publication of the following innovation management standards:

- ISO 56007- tools and methods for idea management [18],
- ISO 56008- guidance for tools and methods for innovation operation measurements [19], and
- ISO 56010 with illustrative examples of ISO 56000 [20].

As can be seen from this exhaustive list of standards, innovation management systems are multi-faceted. In order to reap the full benefits of the ISO 56000 series all the documents and best practices listed above should be implemented as a coherent system.

The advanced level of these standards is confirmed by the European Committee for Standardization (CEN) which has already adopted ISO 56000, ISO 56002, ISO 56003, ISO/TR 56004 as European Norms (EN) replacing and/or adding to its CEN/TS 16555 series.

## 2.3 Innovation management and sustainable development

The United Nations has published its 2030 Agenda with

Sustainable Development Goals. ISO supports this effort with aligning its standards to the UN SDGs [21]. ISO contributes to all of the SDGs. Fig. 2 shows the number of ISO standards that are directly applicable to each Goal.

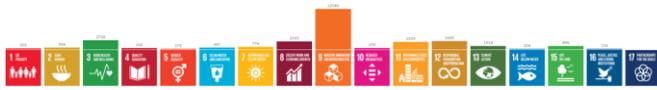


Fig. 2 ISO standards and UN SDGs.

The highest column on the chart represents the 12194 standards related to innovation management, industry and infrastructure.

Fig. 3 presents a matrix showing the relationship between the ISO 56000 series of standards and the UN SDGs.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
ISO 56000																		
ISO 56001	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
ISO 56002				✓					✓	✓								
ISO 56003				✓					✓	✓								
ISO/TR 56004				✓					✓	✓								
ISO 56005				✓					✓	✓								
ISO 56006				✓					✓	✓								
ISO 56007				✓					✓	✓								
ISO 56008				✓					✓	✓								
ISO/TR 56010										✓								

Fig. 3 The ISO 56000 series of standards and UN Sustainable Development Goals (SDGs).

It is clear that 3 of the SDGs are supported by most of the innovation management standards. These SDGs are:

- Goal 4: Quality Education;
- Goal 8: Decent work and economic growth;
- Goal 9: Industry, innovation and infrastructure.

The target for SDG 9 is to 'enhance scientific research, upgrade the technological capabilities of industrial sectors in all countries, in particular developing countries, including, by 2030, encouraging innovation and substantially increasing the number of research and development workers per 1 million people and public and private research and development spending'. The achievement of this target is supported by two specific indicators:

- Research and development expenditure as a proportion of GDP, and
- Researchers (in full-time equivalent) per million inhabitants.

The 2020 UN Report on the SDG summarizes the trend in these indicators as 'Despite progress in recent years, investments in research and development need to accelerate, in part to cope with COVID-19'.

This finding is supported by the publication of strategic documents such as The Oslo Manual [22], policy and initiatives by the European Commission [23], 'ISO and Innovation' [24], etc.

### 3. Conclusion

In line with the Strategy for Higher Education in Bulgaria [25], the University of Ruse is taking active steps towards its implementation. One of the initiatives of the Technology Transfer and Intellectual Property Centre is to develop and implement an innovation management system. A core module in this system in the intellectual property management with its main purpose to create value for the university, its research community, partners and other interested parties.

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