

The experience gained from implementing an ISO 56000-based innovation management system

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ABSTRACT

The aim of this paper is to share the experience gained from an early adoption of the ISO 56000 series of standards for innovation management systems. The University of Ruse is among the first universities in Bulgaria to implement an ISO 9001 quality management system. Later this system is updated and extended with elements of ISO 21001:2018- management systems for educational organizations. Since 2020 the Technology Transfer and Intellectual Property Centre (TTIPC) at the University of Ruse has implemented a number of requirements and guidelines of the ISO 56000 series of standards. The foundation of the integrated management system is ISO 56002:2019 with guidance for innovation management. The principles for innovation management from ISO 56000:2020 are being followed while implementing key methods and tools from ISO 56003:2019 for innovation partnership, ISO/TR 56004:2019 for innovation management assessment, ISO 56005:2020 for intellectual property management, and ISO 56006:2021 for strategic intelligence.

Section: RESEARCH PAPER

Keywords: innovation management system; ISO 56000 series; intellectual property management; best practice

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1. INTRODUCTION

Innovations are a key factor for organizational success. The ever more frequent use of the word 'innovation' threatens to cause lack of sensitivity towards its true essence. In a way this is similar to the use of the word 'quality' which now represents anything meaning perfection, excellence, conformity, satisfaction, etc.

The ISO 9000 series of standards is globally recognized as a model of a successful management system. The fundamentals, vocabulary and the quality management principles are established in ISO 9000:2015. The requirements for a quality management system are specified in ISO 9001:2015. The guidance on the implementation of ISO 9001 requirements, as well as some examples are given in ISO/TS 9002:2016. The guidance to achieve sustained success of the organization is given in ISO 9004:2018. This standard also contains a 5-level self-assessment tool for various quality management processes. Clause 11.4 defines the guidance for processes related to innovation.

In time, the upward trend of ISO 9001 certified quality management systems has somewhat slowed down thus giving way to other management systems, such as information security,

energy, and more specifically- to innovation management systems [1]. This is reaffirmed by Lines et al. along with highlighting the importance of the process approach and the "Plan-Do-Check-Act" (PDCA) cycle for all management system standards published by the International Organization for Standardization, ISO [2]. The PDCA cycle and innovations are also part of the standard ISO 21001:2018.

The factor which practically makes the difference in quality management systems is the rate of improvement- be it incremental or continual. Any innovation may be considered to be an improvement, but not every improvement is innovative.

This paper presents an overview of ISO 56000 based innovation management systems in order to better understand the significance of such management systems and the perceived benefits from their implementation.

The current state of the ISO 56000 series of standards for innovation management systems is discussed in Section 2. In Section 3 some examples of the implementation of guidance standards from the ISO 56000 series at the University of Ruse are described. Finally, in the concluding section, some of the proven practices for innovation management are summarized.

2. THE ISO 56000 SERIES OF STANDARDS

The need for a specific standard for innovation management systems became evident at the turn of the 21st century. A detailed chronology of the development of innovation management standards is presented by da Silva [3]. In 2008 the European Committee for Standardization (CEN) has created a specific technical committee on innovation management- CEN/TC 389 which published the first set of international standards on innovation management – the CEN/TS 16555 series.

This initiative is continued by the International Organization for Standardization which established a similar technical committee- ISO/TC 279 “Innovation management”. Until January 2023, ISO has published six standards for innovation management, part of the ISO 56000 series:

- ISO 56000:2020 Innovation management - Fundamentals and vocabulary [4];
- ISO 56002:2019 Innovation management - Innovation management system - Guidance [5];
- ISO 56003:2019 Innovation management - Tools and methods for innovation partnership - Guidance [6];
- ISO/TR 56004:2019 Innovation Management Assessment - Guidance [7];
- ISO 56005:2020 Innovation management - Tools and methods for intellectual property management - Guidance [8];
- ISO 56006:2021 Innovation management - Tools and methods for strategic intelligence management - Guidance [9].

Four additional ISO standards are at different stages of development:

- ISO/AWI 56000 Innovation management - Fundamentals and vocabulary (an update of the standard ISO 56000:2020);
- ISO/CD 56001 Innovation management - Innovation management system - Requirements [10];
- ISO/FDIS 56007 Innovation management system - Tools and methods for managing opportunities and ideas - Guidance [11];
- ISO/DIS 56008 Innovation management - Tools and methods for innovation operation measurements - Guidance [12];
- ISO/CD TS 56010 Innovation management - Illustrative examples of ISO 56000 [13].

The similarity of the concepts behind ISO 9000 and ISO 56000, and ISO/TS 9002 and ISO 56002 is noticeable. Yet, the approach applied for developing innovation management standards is substantially different.

Instead of publishing the standard with requirements for innovation management systems- ISO 56001 first, and then giving guidance on their implementation, ISO/TC 279 has chosen a more customer-friendly approach. This “innovation” allows the potential developers, implementers and auditors of innovation management systems to establish their systems based on the guidance and supporting standards. Only when sufficient practice in maintaining such systems is in place, the requirements standard will be used to audit and possibly certify for conformance to ISO 56001.

2.1. ISO 56000:2020 Innovation management fundamentals and vocabulary

This standard is prepared by ISO/TC 279 “Innovation management” with the purpose to clarify the terminology, concepts and principles to be used in the whole ISO 56000 series of standards. 8 groups of terms are defined in Clause 3. They are related to innovation, organization, objective, knowledge, intellectual property, innovation initiative, performance, and assessment. The alignment of these terms and definitions with the Oslo Manual and the definitions of intellectual property in TRIPS (Agreement on Trade-Related Aspects of Intellectual Property Rights) and WIPO (World Intellectual Property Organization) is made clear in Annex B of ISO 56000:2020.

In addition to clarifying the impact of innovations, Clause 4 outlines the fundamental concepts and the 8 innovation management principles:

- Realization of value;
- Future-focused leaders;
- Strategic direction;
- Culture;
- Exploiting insights;
- Managing uncertainty;
- Adaptability;
- Systems approach.

Each of these principles is detailed using a structure of 4 elements: statement, rationale, key benefits, and possible actions. This allows the innovation managers in the organization to have a clear purpose (the statement), some helpful information to raise awareness and achieve motivation of the interested parties (rationale and key benefits), as well as an outline of an action plan to establish the foundations of a solid innovation management system (possible actions).

2.2. ISO 56002:2019 Innovation management system guidance

This standard follows the high-level structure of Annex SL. This makes the clauses of ISO 56002, parts of the text, some terms and definitions identical with the ones used in other management systems standards, and more specifically- ISO 9001 for quality management systems.

Some elements are added to the “backbone” of Annex SL such as: innovation culture, innovation vision, innovation strategy, innovation portfolios, etc. In Clause 7 “Support”, important additions are: tools and methods, strategic intelligence management, and intellectual property management. These elements are further explained and extensively discussed in the supporting standards of the ISO 56000 series. New structural elements in Clause 8 “Operations” are the innovation initiatives and the innovation processes comprising of identifying opportunities, creating concepts, validating concepts, developing solutions, and deploying solutions. These steps of the innovation process are also aligned with the steps of the PDCA cycle, just like the overall arrangement of the clauses of ISO 56002.

The role of metrology is clearly outlined in Clause 9 “Performance evaluation”, and more specifically in 9.1 “Monitoring, measurement, analysis and evaluation”.

Clause 10 “Improvement” completes the PDCA cycle with deviation, nonconformity and corrective action, and continual improvement of the innovation management system.

This general analysis of the standard ISO 56002:2019 should not be misleading. The in-depth analysis of the content of each clause shows a specific focus on innovation system management which cannot be found in other management system standards.

2.3. ISO 56003:2019 Tools and methods for innovation partnership

Innovations are often the result of teamwork and partnerships. The guidance of ISO 56002:2019 refers to partners on a number of occasions, such as:

- A tool for managing uncertainty and risk;
- An element of the context of the organization;
- A key interested party;
- An element to consider when determining the scope of the innovation management system;
- A possibility for collaboration (Clause 4.4.3);
- An outsourcing opportunity;
- A source of knowledge, competence, finances, and infrastructure;
- A recipient and a source of information in the communication process;
- A source and a user of intellectual property rights;
- A counterpart in innovation initiatives and processes.

The core of this standard can be found between clauses 4 to 8 and includes:

- The innovation partnership framework (Clause 4);
- Making the decision whether to enter an innovation partnership or not (Clause 5 and Annexes A and D);
- Selecting internal and external partners by generating a long list, and then- a short list of potential partners, and ultimately deciding based on objective criteria (Clause 6 and Annex B);
- Partnership alignment and signing a non-disclosure agreement (NDA), a memorandum of understanding, a letter of intent or other legally binding agreements (Clause 7 and Annex C), and
- Managing the interactions between the partners throughout the lifetime of the innovation partnership (Clause 8 and Annex D).

All the annexes provide guidance on the applicable tools and methods for the clauses of ISO 56003:2019. Annex E presents a guidance on monitoring, measurement, analysis and evaluation of a set of quantitative and qualitative innovation performance indicators, and links them to the performance evaluation criteria set out in Clause 9.1 of ISO 56002:2019.

2.4. ISO/TR 56004:2019 Innovation management assessment

This standard continues the measurement of the innovation performance indicators. As outlined in Clause 4, this is done in order to:

- Gain a better understanding of innovation management;
- Determine the performance of the current innovation management;
- Meet internal and/or external requirements, and
- Improve the performance and increase the value of the organization.

In Clause 5 “Choosing the innovation management assessment (IMA) approach” organizations can find different IMA approaches, examples of quantitative and qualitative measures that serve as performance criteria for innovation management, as well as guidance on the type, quality and format of the IMA outputs.

Clause 6 “The IMA process” visualizes the rest of the clauses and how they interconnect within the Plan-Do-Check-Act cycle:

- Prepare (*Plan*) the IMA (Clause 7)- aligning the strategic intent and the scope of the IMA, defining the design, the expected results and the performance metrics of the IMA, clarifying the resources needed and the organization’s ability and willingness to change, and setting up the IMA;
- Conduct (*Do*) the IMA (Clause 8)- setting up the necessary tools, collecting quantitative and qualitative data, analysing data and identifying gaps in innovation management and IMA;
- Conclude (*Check*) the IMA (Clause 7)- documenting IMA findings, structuring the IMA report content, communicating findings to relevant top management and interested parties, and recommending actions for improvement;
- Improvement (*Act*) of the IMA itself- determining and implementing a roadmap for enhancing future IMAs.

About half of the ISO 56003:2019 standard is devoted to the 7 principles that facilitate the design and implementation of the IMA (Annex A), and visual examples how to present the aggregated results (dashboard and radar diagram) and detailed results (histogram, bar chart, benchmarking of key performance indicators, scoreboard, etc.) from the IMA (Annex B).

2.5. ISO 56005:2020 Intellectual property management

Innovation is intrinsically related to intellectual property (IP) whether or not it is protected by a patent, utility model, trademark, industrial design or other type of intellectual property rights (IPR). The effective and efficient management of IP and IPR can substantially increase the innovative potential of the organization by improving the competence of its people and enhancing organizational knowledge.

This standard builds on the foundations set in Clause 7.8 “Intellectual property management” of ISO 56002:2019 and supports the innovation strategy of the organization. The IP management framework (Clause 4) encompasses: the context of the organization, the commitment of top management, leaders and IP managers, the innovative culture, the knowledge, competence, education and training of human capital, the financial and legal considerations. Clause 5 of ISO 56005:2020 defines the interrelationship between the business strategy, the innovation strategy, and the IP strategy of the organization.

Clause 6 “IP management in the innovation process” has identical structure to that of Clause 8.3 “Innovation process” in ISO 56002:2019, also aligned with the PDCA cycle:

- 1) General;
- 2) Identify opportunities (*Plan*);
- 3) Create concepts (*Do*);
- 4) Validate concepts (*Check*);
- 5) Develop solutions (*Act*);
- 6) Deploy solutions (*Act*).

This sequence of steps in the innovation process is logical but by no means it is linear. Whatever the case, this process is proven to lead to more efficient innovations by streamlining the efforts of researcher teams and innovators, and innovation partnerships.

By combining elements from “The Golden Circle” (*Why? – How? – What?*) and SIPOC diagrams (*Suppliers – Inputs – Process steps – Outputs – Customers*) for each of the abovementioned steps, Clauses from 6.2 to 6.6 provide detailed guidance on:

- *Why* this is important for IP management?

- What are the necessary *Inputs* to be considered in the innovation process?
- *How* should this be done throughout the lifecycle of the innovation initiative?
- The *Outputs* resulting from these activities.

In most cases, the outputs from the previous step(s) should serve as inputs for the next step(s) in the innovation process.

The ISO 56005:2020 supports the implementation of Clause 6 by providing 6 annexes with tools and methods for:

- Invention record and disclosure (Annex A);
- IP generation, acquisition and maintenance (Annex B);
- IP search (Annex C);
- IPR evaluation (Annex D);
- IP risk management (Annex E);
- IP exploitation (Annex F).

2.6. ISO 56006:2021 Strategic intelligence management

Clause 7.7 “Strategic intelligence management” of ISO 56002:2019 states that “*Strategic intelligence can include activities to acquire, collect, interpret, analyse, evaluate, apply, and deliver to, or share between, decision-makers and other relevant interested parties, the necessary data, information, and knowledge.*” [5]. This information shall be communicated to the top management of the organization in order to align it to the strategic direction, to anticipate and manage change, and to navigate the organization successfully into a volatile, uncertain, complex and ambiguous (VUCA) environment.

The standard ISO 56006:2021 shares the same 8 innovation management principles as ISO 56000:2020 and adds aspects of strategic intelligence to the statement of each principle. Clause 3 “Terms and definitions” has two elements- 3.1 “Intelligence”, and 3.2 “Strategic intelligence”. When the two terms are combined, their definitions would convey the following meaning of strategic intelligence: the result of gathering, analysing and interpreting data (related to market, technology, competition, intellectual property or business), information and knowledge directed to top management with recommendations to make decisions impacting the vision, strategy, policy and objectives as well as innovation activities of the organization.

Clause 4 presents the fundamentals of strategic intelligence such as: purpose, needs, core process, timing, expected outcomes, and essential support in terms of infrastructure and competencies. The strategic intelligence cycle follows the DIKI model: *Data – Information – Knowledge – Intelligence*. This model is presented in more detail in Clause 5 and consists of the following steps:

- *Framing*- defining the criteria and scope for intelligence generation;
- *Data gathering and analysis*- with main outcome *information, or analysed data*;
- *Interpretation*- with outcome *knowledge, or interpreted information*;
- *Recommendation*, based on knowledge with outcome *intelligence, i.e., communicated knowledge*.

Clause 6 “Intelligence communication” consists of 6.1 “Recommendations to top management”, and 6.2 “Documentation, communication and distribution control”.

The other standards of the ISO 56000 series are at different stages of development. Undoubtedly, upon their publication, they will have a major impact on the understanding and implementation of innovation management systems.

3. IMPLEMENTATION OF ISO 56000 GUIDANCE AT THE UNIVERSITY OF RUSE

The implementation of management systems in higher educational organizations began by adapting ISO 9001 requirements to the actual educational environment. Naturally, the pre-existing management systems and the international and national regulatory documents served as bases for the additional requirements.

The Technology Transfer and Intellectual Property Centre (TTIPC) at the University of Ruse “Angel Kanchev” is integrating elements of innovation management systems. This improvement to the existing quality management systems integrates the requirements of ISO 9001:2015 and of ISO 21001:2018 with the guidance of ISO 56002:2019.

The process has started in 2020 with the election of the current manager of the TTIPC. The value of the books “ISO 56000: Building an Innovation Management System: Bring Creativity and Curiosity to Your QMS” by Peter Merrill [14], and “Managing Innovation: Integrating Technological, Market and Organizational Change” by Joe Tidd and John Bessant [15] cannot be overestimated. The implementation of the ISO 56000 series of standards encompasses the elements from 3.1 to 3.8.

3.1. Updated innovation vision, mission, strategy, policy, and objectives

These strategic documents specified in ISO 56002:2019 are developed by the Manager of the TTIPC and approved by the Academic Council and the Rector of the University of Ruse. The *innovation mission* of the TTIPC is to promote the protection of intellectual property of the researchers at the University of Ruse, and to expand the opportunities for realization of modern technologies by partners of the University of Ruse. The *innovation vision* is to ensure that the University of Ruse is established and a regional leader in the realization of its intellectual property. The *innovation strategy* being followed is to determine the existing opportunities for progress and to seek out “burning issues” that require innovative solutions which can be developed by multidisciplinary teams of researchers at the University of Ruse and its partner organizations. The *innovation policy* states that the top management is committed to achieving the status and recognition of a research university while always striving for continual improvement of the innovation management system. The *innovation objectives* are consistent with the innovation policy. There is a requirement for all professors and research staff to participate in research projects, as well as to develop and register IP with a stronger focus on international and Bulgarian patents, utility models, and submitted applications for IPR protection.

3.2. Streamlined innovation management process

Prior to 2020, there were 3 different centres focusing on different aspects of the TTIPC. These were:

- The Centre for Intellectual Property;
- The Centre for Technology Transfer;
- The Danube Transfer Centre.

By using the guidance of ISO 56002:2019 and ISO 56005:2020, the TTIPC now implements a series of innovation management processes that encompass the identification of opportunities, creation and validation of concepts, developing and deploying solutions. Since 2022, the prevention and monitoring of infringement of IP and copyright are added to the scope of activities of the TTIPC by implementing the system

approved by the Ministry of Education and Science of Bulgaria - [StrikePlagiarism](#).

3.3. Innovation portfolio

The first innovation portfolio of the University of Ruse meeting the intent of the guidance of Clause 6.4 of ISO 56002:2019 is presented on Figure 1.

The TTIPC has developed and published innovation portfolios yearly. Currently there are the 2021 and the 2022 editions which contain all existing and newly registered intellectual property rights (IPR)- patents, utility models, trademarks, designs, etc. This allows the realization of synergies, including possibilities for re-use and optimization. An added benefit from the innovation portfolio is that it is used to raise interested parties' awareness of the IPR of the university and its researcher community, and last but not least- to improve the visibility of innovators and their success stories.

3.4. IPR database

The initial stages of IPR management can be characterised as utterly basic and passive. There used to a very general list of patents and utility models with no specific information. The newly created and continuously updated database of IPR includes the following elements:

- Type of IPR with colour coding for different IPR;
- Date and number of the application;
- Date and number of the registration by the Patent Office;
- IPR owner(s) and/or Inventor(s);
- Period of validity, including a calendar of the dates of validity allowing to have objective evidence (a scanned certificate) on any given date (see Figure 2);
- Payment status.

The IPR database is used as an input for reporting the performance of the innovation management system at top management reviews and/or responding to external inquiries.

3.5. Assessments of the performance of the innovation management system

These assessments are done periodically depending on the level of reporting. The TTIPC presents quarterly reports to the Director and the Managing Council of the Research & Development Centre (R&DC) at the University of Ruse. In addition, the detailed annual report contains all the major



Figure 1. Innovation portfolio of the University of Ruse for the period 01 January 2020 – 31 December 2020 [In Bulgarian].

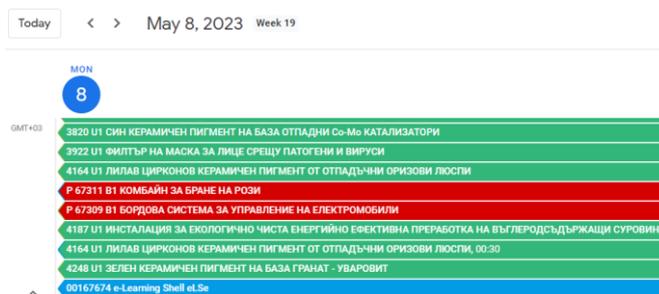


Figure 2. Calendar of the IPR database [in Bulgarian].

activities and key performance indicators of the innovation management system. This is done in line with:

- The criteria and procedures of the Ministry of Education and Science, and the National Evaluation and Accreditation Agency;
- The guidance of ISO/TR 56004:2019 about performance criteria (Clause 5.2.1) and performance metrics (Clause 7.4);
- The internal regulations of the University of Ruse “Angel Kanchev” [16], [17].

The continual improvement of the implemented innovation management system is also assessed for positive change in the maturity level of the system [18]. The performance is communicated to interested parties by aligning the innovation management system with the ISO 56000 series of standards and the United Nations Sustainable Development Goals [19].

3.6. Innovation partnerships

The innovation portfolio has made the application of the guidance of ISO 56003:2019 a priority. Some teams of innovators have existed prior to the implementation of the innovation management system. They generally comprised of researchers from the same scientific field. Rarely they involved inventors from other departments and faculties, and even less often- collaborators from external organizations. These partnerships generate better overall outcomes and outputs.

The implementation of ISO 56003:2019 at the University of Ruse is presented in [20]. Initially, the long list of potential partners was created based on the information contained in the innovation portfolio, and the discussion with interested parties. Using the criteria, described in ISO 56003:2019, the long list was reduced. The result of the partnership selection has produced an interdisciplinary team of researchers from 3 faculties, 5 different departments, PhD, MSc and BSc students, and an external practitioner.

3.7. Management of strategic intelligence

ISO 56006:2021 is published as a Bulgarian standard on 23 March 2022 but is not available in Bulgarian. This fact hinders its smooth implementation. To avoid waiting for an official translation, the TTIPC has made a working document based on the guidance of this standard. It is communicated to the Vice-Deans in charge of research so that strategic intelligence from various fields can support the decision-makers in the university.

3.8. Additional innovation management initiatives and activities

Some of the activities arising from the integrated quality, educational and innovation management system, which has placed the University of Ruse among the top research institutions in Bulgaria, are:



Figure 3. Innovative Youth Expo certificate.

- Active membership in professional organizations such as ISPIM- the International Society for Professional Innovation Management, and Special Interest Groups (SIGs);
- Participation in conferences, seminars, webinars and workshops aiming to exchange best practices;
- Organizing seminars to obtain buy-in from internal and external interested parties;
- Promoting best practices by making interviews with successful innovators;
- Participation in promotional events such as the annual Innovative Youth Expo (see Figure 3), etc.

4. CONCLUSIONS

The experience of the University of Ruse with the innovation management system shows that the best results and performance of the management system are achieved when the organization:

- Carefully considers the current context and emerging trends and technologies, as well as the requirements of relevant interested parties;
- Successfully manages the competence, awareness and involvement of key representatives of top management, researchers, professors, laboratory technicians and administrative staff;
- Actively engages in professional organizations, projects and trainings;
- Timely aligns its strategic direction with international and national regulatory documents and frameworks;
- Embraces change and creates its own the future.

The guidance, tools and methods of the ISO 56000 series of standards are creatively implemented and have contributed to a significant improvement of the innovation management system.

REFERENCES

[1] The ISO Survey of Management System Standard Certifications 2021. 24 January 2023. Online [Accessed 28 January 2023] https://www.iso.org/home.isoDocumentsDownload.do?t=9z0jVMCB1svKz9z0zeJqmEgPescZmGL_Ggsogk7yEs3DbszNyGU5-tLKAPLnmw68&CSRF_TOKEN=SR21-GSTR-4LVN-QG1K-NEGG-S2PA-VMFO-TXER.

[2] K. Lines, J.-L. Hippolyte, I. George, P. Harris, A MATHMET Quality Management System for data, software, and guidelines, Acta IMEKO, vol. 11, no. 4, (2022), pp. 1-6. DOI: [10.21014/actaimeko.v11i4.1348](https://doi.org/10.21014/actaimeko.v11i4.1348).

[3] S. B. da Silva, Improving the firm innovation capacity through the adoption of standardized innovation management systems: a comparative analysis of the iso 56002:2019 with the literature on firm innovation capacity, International Journal of Innovation – IJI, 9(2), (2021), pp. 389-413. DOI: [10.5585/iji.v9i2.19273](https://doi.org/10.5585/iji.v9i2.19273).

[4] ISO 56000:2020, Innovation management - Fundamentals and vocabulary.

[5] ISO 56002:2019, Innovation management - Innovation management system - Guidance.

[6] ISO 56003:2019, Innovation management - Tools and methods for innovation partnership - Guidance.

[7] ISO/TR 56004:2019, Innovation management assessment - Guidance.

[8] ISO 56005:2020, Innovation management - Tools and methods for intellectual property management - Guidance.

[9] ISO 56006:2021, Innovation management - Tools and methods for strategic intelligence management - Guidance.

[10] ISO/CD 56001 Innovation management - Innovation management system - Requirements. Online [Accessed 28 January 2023] <https://www.iso.org/standard/79278.html>.

[11] ISO/FDIS 56007 Innovation management system - Tools and methods for managing opportunities and ideas - Guidance. Online [Accessed 28 January 2023] <https://www.iso.org/standard/75068.html>.

[12] ISO/DIS 56008 Innovation management - Tools and methods for innovation operation measurements - Guidance. Online [Accessed 28 January 2023] <https://www.iso.org/standard/78485.html>.

[13] ISO/CD TS 56010 Innovation management - Illustrative examples of ISO 56000. Online [Accessed 28 January 2023] <https://www.iso.org/standard/80612.html>.

[14] P. Merrill, ISO 56000: Building an Innovation Management System: Bring Creativity and Curiosity to Your QMS, Quality Press, Milwaukee, 2020, ISBN 978-1-951058-26-9.

[15] J. Tidd, J. R. Bessant, Managing Innovation: Integrating Technological, Market and Organizational Change, Wiley, Hoboken, 2021, ISBN 978-1-119-71319-7.

[16] Tz. Gueorguiev, B. Sakakushev, B. Evstatiev, Improving educational management systems by integrating quality and innovations, 59 Annual scientific conference of Angel Kanchev University of Ruse and Union of Scientists – Ruse “New Industries, Ruse, Bulgaria, 2020, pp. 27-32. Online [Accessed 28 January 2023] <https://conf.uni-ruse.bg/bg/docs/cp20/9.1/9.1-3.pdf>.

[17] Tz. Gueorguiev, Assessment of innovation management and intellectual property, Intellectual property in universities – new horizons of academic dialogue, Sofia, Bulgaria, 2022, pp. 217-230 [in Bulgarian]. Online [Accessed 28 January 2023] <https://unyka.unibit.bg/images/pdf/2022-1/15-c-georguiev.pdf>.

[18] Tz. Gueorguiev, Continual improvement and innovations, 6th Int. Conf. on Advances in Mechanical Engineering (ICAME 2021), Istanbul, Turkey, 20-22 October 2021, pp. 320-325.

[19] Tz. Gueorguiev, Innovation management systems – reality and perspectives, International Scientific Journal “Innovations”, vol. 9 (2021), issue 2, pp. 48-50. Online [Accessed 28 January 2023] <https://stumejournals.com/journals/innovations/2021/2/48.full.pdf>.

[20] Tz. Gueorguiev, The role of innovation partnerships in the creation of intellectual property, 61 Annual scientific conference of Angel Kanchev University of Ruse and Union of Scientists – Ruse “New Industries, Digital Economy, Society - Projections of the Future V”, Ruse, Bulgaria, 2022, pp. 11-16. Online [Accessed 28 January 2023] <https://conf.uni-ruse.bg/bg/docs/cp22/9.1/9.1-1.pdf>.