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QUALITY TOOLS FOR ANALYZING THE CAUSES FOR POOR INNOVATION MANAGEMENT PERFORMANCE

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***Abstract:** The paper presents the use of root cause analysis and lessons learned to analyse to causes for poor innovation management performance. The specific case in focus is the performance of the innovation management system and its sub-system dealing with intellectual property management. This study is based on official data from the Bulgarian Patent Office and more specifically the statistics about patents and utility models. The analysis is made using international standards such as ISO 10009 for quality tools and their application, ISO 56001 with requirements for innovation management systems, an ISO 56005 for intellectual property management.*

***Keywords:** Quality Tools, Innovation Management, Intellectual Property Management, ISO 10009, ISO 56005.*

***JEL Codes:** L15, O34*

INTRODUCTION

Quality management and innovation management are intertwined management domains. While the roots of quality management can be based to the industrial revolution, the science of innovation management has developed more recently.

Another thing these two management domains have in common is the international standardization by the ISO 9000 and the ISO 56000 series respectively.

The ISO 9000 series of standards currently covers:

- ISO 9000:2015 with quality management (QM) principles and vocabulary;
- ISO 9001:2015 with requirements for a quality management system (QMS);
- ISO/TS 9002:2016 with guidance on the application of ISO 9001, and
- ISO 9004:2018 with guidance for sustained success.

These core quality management standards of the ISO 9000 series are complemented by the standards of the ISO 10000 series:

- ISO 10001:2018, ISO 10002:2018, ISO 10003:2018, ISO 10004:2018, and ISO 10008:2022 dealing with different aspects of customer satisfaction;
- ISO 10005:2018 with guidance for quality plans;
- ISO 10006:2017 with guidance on quality management in projects;
- ISO 10007:2017 – configuration management;
- ISO 10009:2024 – the latest standard in the ISO 10000 series which is in the focus of this paper, i.e., quality tools and their application (ISO 10009, 2024);
- ISO 10010:2022 about quality culture;
- ISO 10012:2003 and its upcoming second edition with requirements for measurement management systems;
- ISO 10013:2021 dealing with documented information;
- ISO 10014:2021 providing guidance for realizing financial and economic benefits;
- ISO 10015:2019 – competence management and people development;
- ISO 10017:2021 – statistical techniques for ISO 9001:2015;
- ISO 10018:2020 – people engagement;

- ISO 10019:2005 – selection of quality management system consultants and use of their services, and
- ISO/TS 10020:2022 – change management processes.

The current ISO 56000 series of standards encompasses:

- ISO 56000:2020, respectively ISO 56000:2025 – innovation management (IM) fundamentals and vocabulary;
- ISO 56001:2024 with requirements for an innovation management system (ISO 56001, 2024);
- ISO 56002:2019 – guidance for IM, and its upcoming second edition;
- Several standards with IM tools and methods:
 - ISO 56003:2019 – innovation partnership,
 - ISO 56005:2020 – Intellectual Property (IP) management, i.e., the second focus element of this paper (ISO 56005, 2020),
 - ISO 56006:2021 – strategic intelligence management,
 - ISO 56007:2023 – managing opportunities and ideas,
 - ISO 56008:2024 – innovation operation measurements;
- ISO/TR 56004:2019 for IM assessment;
- ISO/TS 56010:2023 – illustrative examples of ISO 56000.

Two more standards are planned to join the ISO 56000 series:

- ISO/TR 56009 – example implementations of innovation operation measurements, and
- ISO 56011 – competency framework for IM.

The purpose of this paper is to demonstrate how quality tools can be used to demonstrate innovation management performance.

EXPOSITION

Raw Data about Patents and Utility Models

The raw data is extracted by the online search for patents and utility models on the website of the Patent Office of the Republic of Bulgaria (BPO, 2024). The patents and utility models used in the search are either the property of the University of Ruse “Angel Kanchev” or their inventors are researchers employed at the same university.

Patents

The main causes for cancelling a patent are shown on Fig. 1 – a quality tool known as a fishbone diagram, described in Annex B “Description of techniques” of (IEC 31010, 2019).

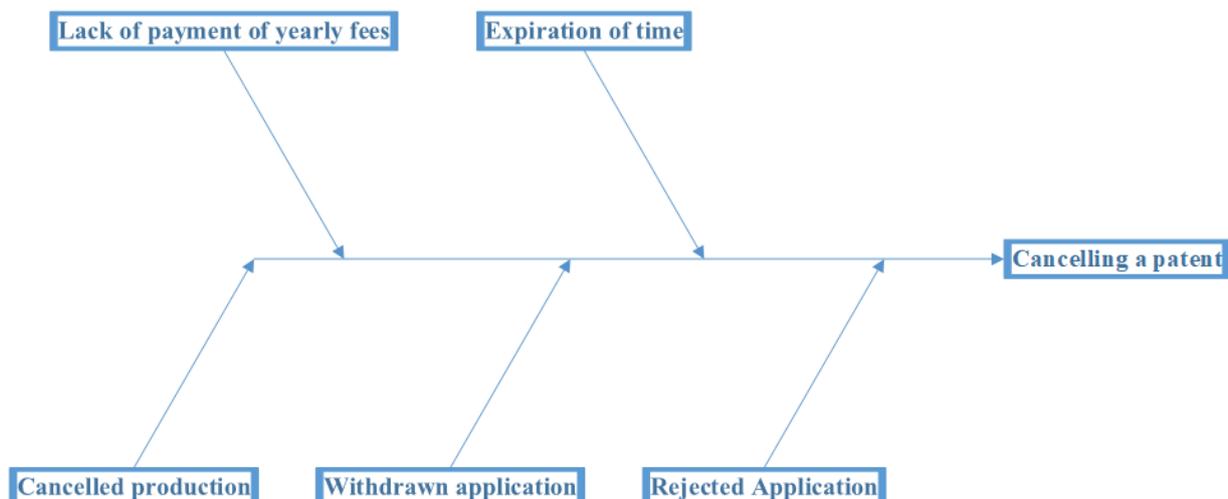


Fig. 1. Main causes for cancelling a patent.

Usually, the main categories of the fishbone diagram are known as the 6Ms: materials, machines, methods, men, measurement, and mother nature (milieu). The fishbone diagram depicted above used the most frequent causes registered at BPO.

The complete list of causes for cancelling a patent is:

- Rejected patent application;
- Withdrawn patent application;
- Cancelled patent production;
- Patent not issued due to the lack of payment;
- Patent issuance fees not paid;
- Patent cancelled due to giving up rights;
- Patent cancelled due to the lack of payment of fees;
- Patent cancelled due to expiration of protection period;
- Patent declared invalid.

Considering the fact that a patent's validity is a maximum of 20 years and the global average validity is about 10 years, the average maintenance of the patents of the University of Ruse in the period 2010-2020 is 6,4 years. This negative trend is even more pronounced in the recent years. Hence, one may raise the legitimate question "Why the actual maintenance of already registered patents is not used to its full potential?".

Experience shows that patents become obsolete quicker than before due to the dynamic development of technology. Thus, the return on investment in protecting IP rights rapidly declines with each consecutive year. In addition, the limited technology transfer limits the incoming financial flows and becomes a burden. This justifies the decision to give up on some IP rights and stop paying the yearly maintenance fees for patents.

Utility Models

A similar list of causes for cancelling a utility model is extracted from the website of the Patent Office of the Republic of Bulgaria. The main causes are:

- Rejected utility model application;
- Withdrawn utility model application;
- Cancelled utility model production;
- Utility model not issued due to the lack of payment;
- Utility model issuance fees not paid;
- Utility model cancelled due to giving up rights;
- Utility model cancelled due to the lack of payment of fees;
- Utility model cancelled due to expiration of the maximum protection period;
- Official termination;
- Utility model obsolete.

The maximum duration of the protection of utility models is 10 years. Due to the lower maintenance fees for utility models, the main cause for their cancellation was "expiration of the maximum protection period" (50% of the utility models owned by the University of Ruse), followed by the leading category in the case of patents – "lack of payment of fees" (33%).

Lessons Learned

Lessons Learned (LL) are a management tool used as a best practice for organizational knowledge management. When systematically applied to a QMS or an IM system they can yield a sustainable data basis and serve as a solid foundation for continual improvement. The ISO standard (ISO 16192, 2024) is the third edition of this best practice applied in space systems that can summarize the background of the root event, the lessons learned, and recommendations.

In its Annex A, ISO 16192:2024 provides three blank generic forms to document the following elements:

- Root event background form;
- Lessons learned form;
- A form for recommendations.

Since the focus of this paper are the LL from IP management, Table 1 presents the lessons learned form completed for patents.

Table 1. Lessons learned form for poor IP performance

1. NAME OF ORGANIZATION	2. RECOMMENDATION №: 003
University of Ruse “Angel Kanchev”	LESSONS LEARNED №: 003
Contact information:	ROOT EVENT №: 003
Manager of the Centre for Technology Transfer and Intellectual Property	Approval date: 2024-01-17
	Approval: Vice-Rector for Research
3. SUBJECT/TITLE/TOPIC(S):	
Poor performance of IP management resulting in patent cancellation due to the lack of payment of fees.	
4. DESCRIPTION OF THE LESSONS LEARNED:	
Technical:	
Payments are made late due to the lack of traceability of deadlines in the previously existing IP centre. Some other payments are not made at all because of the lack of specifically allocated funds for IP generation, IP registration, and maintenance of IP rights protection.	
Management:	
The ISO 56000 series of standards did not exist prior to 2019 and the lack of accessible best practices has brought about random approaches to IP management.	
Documentation:	
Prior to 2020 there was no database of IP rights owned by the University of Ruse.	

A similar form can be completed also for the other causes for poor IP performance in respect to patents, utility models, trademarks and designs. When this information is summarized and brought to the attention of top management, it can serve as the foundation for impactful decisions. Some of the recommendations that can be formulated based on the lessons learned form are:

- *Technical:* allocation of specific funds that can ensure timely payments of IP fees to the relevant patent office, as well as keeping the holders of IP rights informed about pending payments;
- *Management:* using the elements of the innovation management system developed in compliance to the requirements of ISO 56001:2024, the guidance of ISO 56002:2019, and the other supporting standards of the ISO 56000 series;
- *Documentation:* periodical maintenance of the IP database created by the Manager of the Centre for Technology Transfer and Intellectual Property. The lack of such a function in a research organization introduces risk to providing timely and objective evidence of IP rights to national and international institutions and partners.

CONCLUSION

The possible causes for poor innovation performance can be further explored using additional quality tools (Tague, 2023). A modern tool that can yield better results is to establish, implement and continually improve an innovation management system based on the ISO 56000 series of standards. This requires visionary leadership and long-term planning in respect to the development and motivated professionals in IP management. If and when this is done successfully, it will ensure better IP performance and maintaining the status of the University of Ruse “Angel Kanchev” as a research higher education institution.

REFERENCES

IEC 31010:2019 Risk management — Risk assessment techniques.

ISO 10009:2024 Quality management — Guidance for quality tools and their application.

ISO 16192:2024 Space systems — Lessons learned — Principles and guidelines.

ISO 56001:2024 Innovation management system — Requirements.

ISO 56005:2020 Innovation management — Tools and methods for intellectual property management — Guidance.

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