International Journal of Management (IJM)
Volume 11, Issue 3, March 2020, pp. 36–42, Article ID: IJM_11_03_005
Available online at http://iaeme.com/Home/issue/IJM?Volume=11&Issue=3
Journal Impact Factor (2020): 10.1471 (Calculated by GISI) www.jifactor.com
ISSN Print: 0976-6502 and ISSN Online: 0976-6510

THE PROBLEMS OF STANDARDS CLASSIFICATION

N.K. Kazantseva, G.A. Tkachuk, A.L. Nevolina, V.S. Shavrin
Federal State Autonomous Educational Institution of Higher Education
Ural Federal University named after the first President of Russia B.N. Yeltsin (UrFU)
Institute of New Materials and Technologies, Ekaterinburg, Russia

ABSTRACT

In the beginning of its development, each new technological mode uses available infrastructure, traditional energy carriers, and stimulates their subsequent expansion. At technological mode alteration the standardization, being one of the most important tolls for creation of new infrastructure, also changes its role, its objects and methods. The current classification system of standards is flat and highly ramified, therefore the direct connection between standards and rapid response to requirement changing are impossible. How to change the classification system of standards, designed to manage regulatory documents in modern conditions.

Keywords: digital economy, standardization, standards requirements, classification system of standards.

Cite this Article: N.K. Kazantseva, G.A. Tkachuk, A.L. Nevolina, V.S. Shavrin, The Problems of Standards Classification, *International Journal of Management (IJM)*, 11 (3), 2020, pp. 36–42.
http://iaeme.com/Home/issue/IJM?Volume=11&Issue=3

1. INTRODUCTION

The development of economic relations in conditions of tough competition between separate manufacturers and whole countries at mandatory goods and services price reduction has stimulated informational technologies development and wide-spread occurrence. Nowadays, various terms are used for this phenomenon: “new technological mode”, “digital economy”, “API economics”, “application economics”, etc. In Russia the term “digital economy” is the most often used one. In specialists’ opinion the ways, leading to implementation of technological mode alteration concept itself – creation of digital economics – are quite different. However, each of them considers deep integration of informational and telecommunication technologies with real economical processes of one or another country only in case of global regulations, rules and standards observation [1].

2. TOPICALITY AND SCIENTIFIC IMPORTANCE

In the beginning of its development, each new technological mode uses available transport infrastructure, traditional energy carriers, and stimulates their subsequent expansion in conditions of production output blistering increase. Later on, in the course of the next technological mode development a new infrastructure type is created and the transfer to new types of energy carriers is executed [1].

At technological mode alteration the standardization, being one of the most important tolls for creation of new infrastructure, also changes its role, its objects and methods.

3. RESEARCH OBJECTIVE

Let's trace dynamics of modern standardization development at different stages of technical and economical development of the society (see Table 1) [4].

Table 1 Change in standardization when changing the technological structure of society

Technological mode characteristic		**Time period**	**Standardization level**	**Achievements of technological mode**
Technological mode	*I*	1785-1835	Elements of standardization promotes agglomeration and mechanization of production	Mechanization of factory production
	II	1835-1880	Elements of standardization promotes growth of production scale	Growth production scale
	III	1880-1930	National standardization and National standards had been forming	Centralization of bank and financial capital
	IV	1930-1970 (1930-1990)	International standardization and international standards had been forming	Mass and batch production
	V	1970-2010 (1990-2035)	Standardization is used to solve social problems. Harmonization of standards requirements	Individualization of production and consumption

Originally, separate elements of standardization were used mainly in the industrial area, promoting growth of the output scale and mechanization. By the beginning of XIX, national standardization systems have been formed in the countries with developed industry, which promoted creation of large scale and batch production within its country. The following step of standardization development was the creation of international standardization organizations. The role of standardization in this period is well described by the slogan of standardization of the year 1992: "International standards are the key to opening markets". At the boundary between XX and XXI centuries apart from the industrial area the wide use of standardization for society social problems solution started, which was evidenced in standardization slogan of those times: "Standards unite the world" or "Standards create equal possibilities". The expansion of cooperation scale in the modern world requires harmonization of requirements of national and international standards in all area of human activities, and it was the next step to the development of standardization. The harmonization of standards promotes mutual understanding of the information, contained in the standards of different countries, and bringing requirements of the standards into compliance with general

regulations, related to product interchangeability, test results approval, safety and other aspects of cooperation. This message is reflected in the slogan of the International Day of Standards, 2018: “International standards and the fourth industrial revolution”. In their traditional message, the Managers of three leading international standardization organizations – IEC, ISO and ITU – notice, that “Nowadays, the standards will fulfil the key role at transferring to the new epoch”. The slogan of the Day of Standardization, 2019: “Video-technology standards create a global platform”.

In conditions of rapidly changing requirements, determined by the development of informational and digital revolution, the necessity of evaluation and of changing, if needed, extreme number of various standard provisions appears.

Maybe, exactly that is why today the most important performance of work in the area of standardization is the term of new standard approval.

Fundamentally, the standards are the documents, which contain the ultimate expression of priceless knowledge and experience, cumulated with time and time proven. In conditions of informational and digital revolution the period of validity of the data, collected in the standard, reduces, and the number of the documents increases. It is impossible to accelerate continuously the pace of reviewing standards, approving new standards, requiring increasing volume of scrupulous technical activities, namely: systematization, optimization, and mutual coordination of the requirements. In order to delegate this large work to a machine, the specialists in the area of standardization shall initially develop an algorithm of development of a standard and making alterations to current standards, which will correspond to digital economics objectives and aims.

4. THEORY

In the opinion of the standardization area leading specialists, the standardization system may be referred to the class of multipurpose ergatic systems, determining interaction of labour subject and object, and in more expanded form this is the system “man-machine-environment-society-culture-society” [4,7]. In conditions of quite rapid changing of ergatic system elements, caused by the informational and digital revolution, which is ready to overtake all types of human activities, the system qualitative changes are inevitable.

The standardization purposes and functions are implemented through the regulatory documents, valid in the area of standardization and, in the first instance, through the created system of regulatory data classification. Nowadays, the classification system, approved within the All-Russian Classifier of Standards (ARCS), which represents the complete genuine text of the international classifier of standards, describes structurally the national database of standards, valid in the Russian Federation. The document was firstly developed and implemented by ISO in 1993, and today the revision of the year 1996 is valid. This international classification is designated to comprise all sectors of economics, all spheres of human activities, where the standards, determining regulations and requirements to various objects, are used.

If talking about the classifier, we are dealing with the hierarchical structure, based on different sections. In total, 99 sections are formed with accountancy of the reserve. All information has three levels of subordinance: sections, groups and subgroups (see Figure 1).

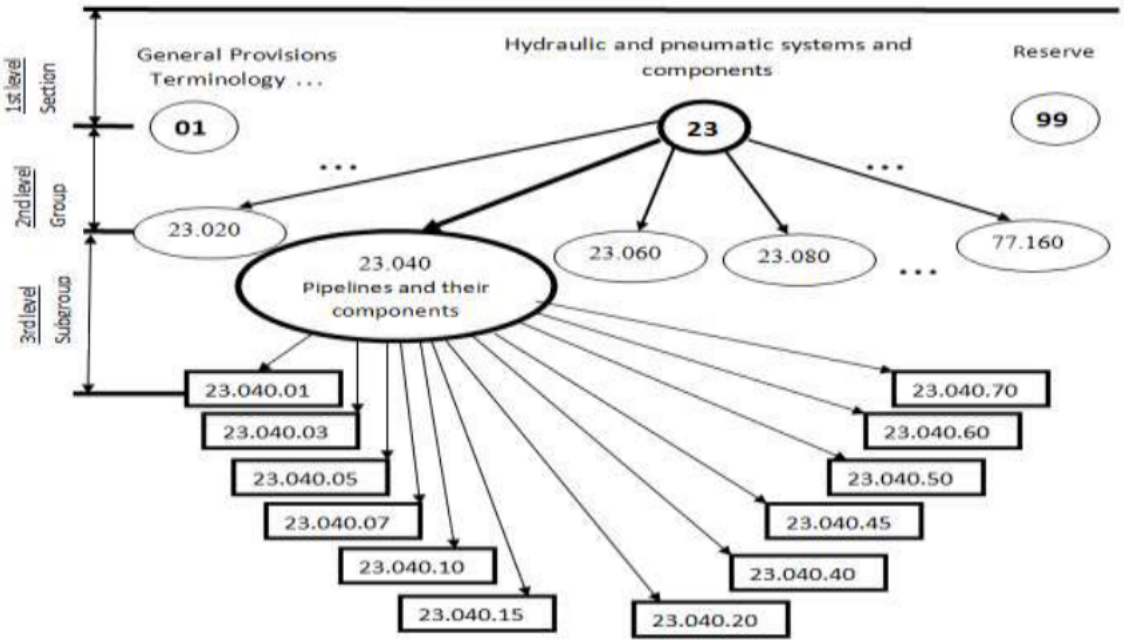

Figure 1 The hierarchical structure of the all-Russian standards classifier

5. STUDY RESULTS

Let's consider interrelations of the requirements of standards through the structure of the All-Russian Classifier of Standards at the example of current standards for pipe products. The total number of currently valid standards amounts to 153. The most number of them refers to the section 23 of the All-Russian Classifier of Standards "Hydraulic and Pneumatic Systems" – 113 standards and almost 74% of the total number of standards (see Figure 2).

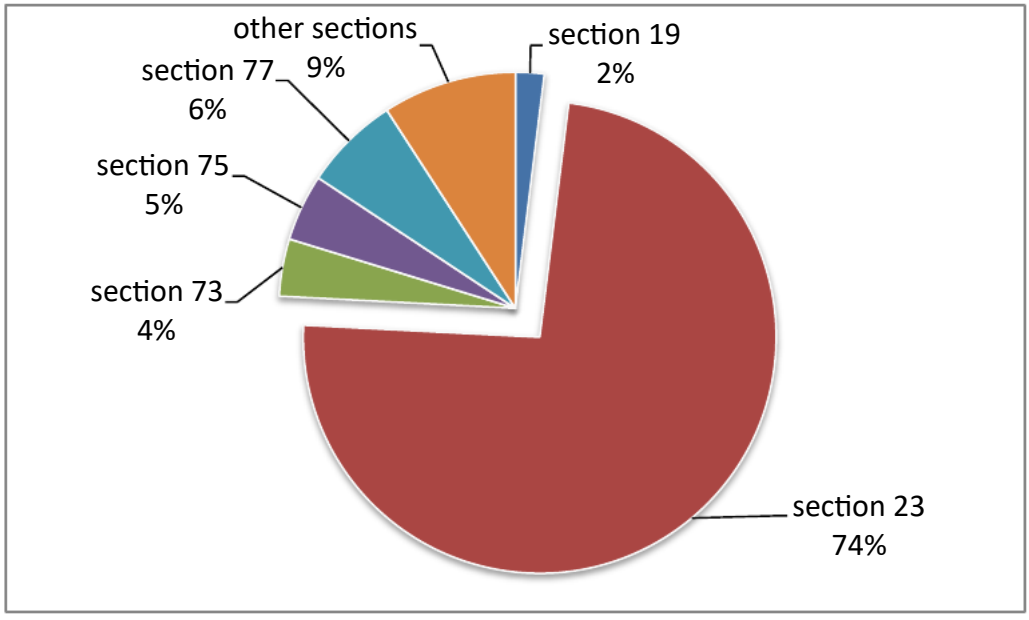

Figure 2 Distribution of current standards for pipe products by sections of ARCS

It shall be mentioned, that all 113 standards enter into the group 23.040 – Pipelines and their components. Inside the group the standards are distributes into several subgroups, provided in the Table 2.

Table 2 Distribution of existing standards within section 23 of the ARCS

Subgroup Designation	Subgroup Name	Number of Standards	
		Adopted before 1999	Adopted since 2000
23.040.01	Pipelines and their components in general	-	1
23.040.10	Steel and cast iron pipes	43	28
23.040.15	Non-ferrous metal pipes	9	12
23.040.20	Plastic pipes	-	18
23.040.60	Flanges and couplings connections.	-	2

The most number of "other" standards refer to the following sections: 77 – Metallurgy, 75 – Extraction and processing of oil, gas, and allied manufacture.

Among the standards, describing requirements to the pipe products, quite non-significant number of standards refer to the following sections: 19 – Tests, 17 – Metrology and measurements. This circumstance gives an idea that mutual coordination of the requirements and complex standardization in the area of tests and measurements comes through sequential references in all 153 standards, describing requirements to pipe products.

This presupposition illustrates well the image of reference distribution, there are already hot-deformed references. The Specifications (All-Russian Classifier of Standards 23.040.10). In total there are references to 56 standards in this standard (Figure 3).

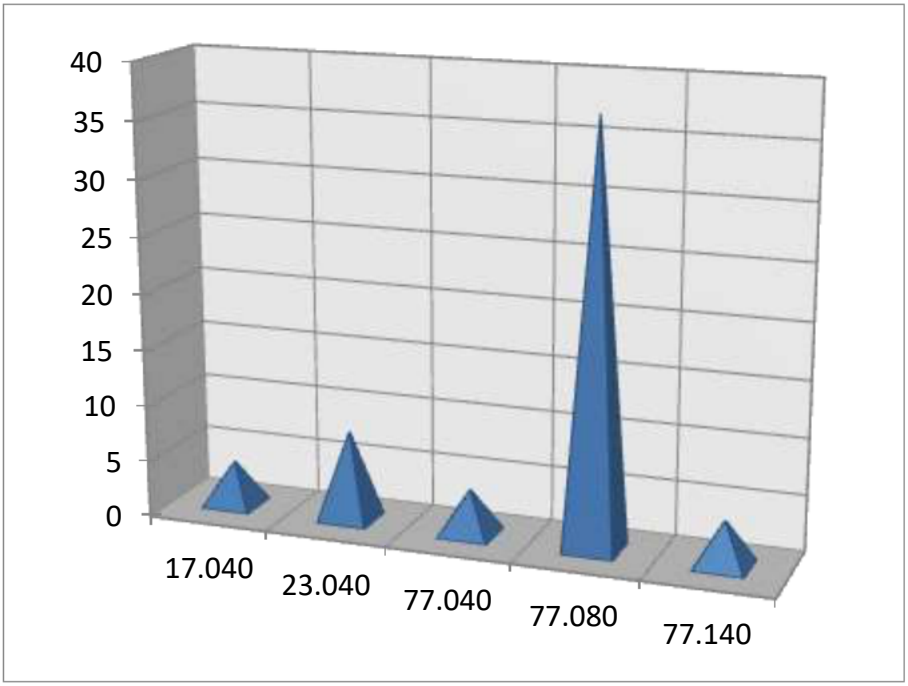

Figure 3 Distribution of standards referenced in GOST 32528-2013 by subgroup of the accepted classification of ARCS

The most number of references ~ 80% are referred to the section 77 – Metallurgy.

In order to clarify the situation we will consider one of 56 standards, specified un the section of regulatory references GOST 32528-2013, describing the products from cast iron

and steel from the group 77.140 – GOST 4543-2016 Metal products from constructional alloy steel. Specifications.

GOST 4543-2016 contains regulatory references to 50 standards, to 11 of which there are already references in GOST 32528-2013. 15 of remaining 39 references relate to the procedure of testing and measurement. Therefore, we can conclude that the requirements to testing and measurement procedure reveals sequentially at transferring from the standard, determining requirements to the products, further to the standards, determining the material, equipment and other requirements, for which there are references in this standard and so on. If we get lower by one more level of the references and consider the standard, specified in the references of the standard GOST 4543-2016, we can mention appearance of 33 more standards, not specified earlier, which enter into the groups 17.040 and 77.040 of the valid classification. So it is obvious that simple making alterations to the current standards or approval of a new standard represent labour consuming and long-lasting procedure of subsequent coordination of requirements and the current system of classification of standards doesn't simplify it.

6. CONCLUSION

Today the structure of valid standards represents the plain and extremely subdivided system. The relations between the standards (system elements) bear exclusively subsequent nature, which leads to document doubling, aiming to reservation of all related requirements. The rigidity and planeness of this system ensures high level of authenticity of information management, and effectively works at non-significant changes, made to the regulatory documents at the same time [6]. Apparently, it is time to search for new standardization solutions. It makes sense to consider other mechanisms of mutual coordination of the requirements, basing on a new multi-level structure, provided with thematic databases and possibilities of digital technologies. In other words, it is required a good debut idea, which will allow to reserve and multiply the data, comprising national and international domain, and create new possibilities for handling the data, contained in the standards.

REFERENCES

[1] Belogragin V.Ya., Zazhigalkin A.V., Zvorykina T.I. Standardization principles: textbook. M: Standards and Quality, 2017. 516 p.

[2] Glazyev S.Yu. Digital Information Revolution // Izborsk Club-2017- No. 8 (54).– P.12-28.

[3] Dobrynin A. P., Chernykh K. Yu., Kupriyanovsky V. P., Kupriyanovsky P. V., Sinyagov S. A. Digital economy - various ways to effective application of technologies (BIM, PLM, CAD, IOT, Smart City, BIG DATA and others), International Journal of Open Information Technologies. Volume 4, no.1, 2016, pp. 4 –10

[4] Zazhigalkin A.V. Standardization: methodology and practice: monograph.– M.: Standards and Quality, 2017. – 89 p.

[5] Zazhigalkin A., Pugachev V., Petrosyan A. Digital economics and the future of standardization // Standards and Quality. № 9. 2017, P. 30-34.

[6] Industrie 4.0. Smart Manufacturing for the Future [Electronic resource] Access mode: http://www.its-owl.de/fileadmin/PDF/News/2014-01-14-Industrie_4.0-Smart_Manufacturing_for_the_Future_German_Trade_Invest.pdf

[7] Kazantseva, N.K., Bildanov, R.G., Aleksandrov, V.A., Olga Lorents and Viktor Kukhar, Preparing a Corporate System of Standards to Digitization, International Journal of Civil Engineering and Technology (IJCIET), 9(6), 2018, pp. 1567–1573.

[8] Norms, rules, standards and legislation of Russia [Electronic resource] Access mode: https://cntd.ru/products/standart#home

[9] Kazantseva, N.K., Kharlamov E.P., Tkachuk G.A., Kazantseva T.V. Assessment of the Reliability of the Locomotive Based on Statistical Methods of Quality Management /IOP Conference Series: Materials Science and Engineering Collection of materials of the International scientific-practical conference "Quality Management and Reliability of Technical Systems". Ministry of Science and Higher Education of the Russian Federation of Peter the Great St. Petersburg Polytechnic University. 2019. P. 012054.

[10] Kazantseva N.K., Bildanov R.G., Aleksandrov V.A., Loretts O., Kukhar V. Preparing a Corporate System of Standards to Digitization, International Journal of Civil Engineering and Technology (IJCIET), Volume 9, Issue 6, June 2018, pp. 1567–1573

[11] Belobragin V.Ya., Zazhigalkin A.V., Zvorykina T.I. Eechnical regulation at the turn of Industrie 4.0. Monograph / V. Ya. Belobragin, A. V. Zazhigalkin, T. I. Zvorykina – M.: publishing “Scientific consultant”, 2019. P 100.