7th International Scientific Conference
Technics and Informatics in Education
Faculty of Technical Sciences, Čačak, Serbia, 25-27th May 2018

Session 2: IT Education and Practice

UDC: 37.018.43(497.11)

The Correlation Between International E-Learning Standards and National Standards of Serbia and Nearby Countries

Dragana Knežević [1*]
[1] Business and Technical College of Applied Sciences, Užice, Serbia
[*] dknezevic28@gmail.com

Abstract: *The paper presents the status of e-learning standards published during the period from 2004 to 2017, focusing on international standards (ISO) on the one hand and national standards of Serbia and nearby countries such as Bosnia and Herzegovina, Croatia, Macedonia, Montenegro, Albania, Hungary, Romania and Slovenia on the other hand. The development trends of the national sets of standards are analyzed and compared with the development trend of international standards regarding both the number of published standards and their prices. The analysis of the data obtained using statistical methods reveals the current status of the national standards in relation to international ones, as well as their interrelationship. The data are also grouped into price ranges, and their relative and cumulative frequencies are determined. The results of the comparison indicate significant differences between the analyzed sets of standards, especially between national and international ones.*

Keywords: *correlation, statistical analysis, standards, e-learning.*

1. INTRODUCTION

Knowledge bases (KB) play a significant role in optimizing the use of tools, technology and knowledge in the field of e-learning. The standardized ISO/IEC 2382:2015 (en) dictionary (Information technology – Vocabulary) [1] (i.e. ISO/IEC 2382-1:1993(en) [2]), explains the meaning of the term "knowledge base"[1] as a "database that contains inference rules and information about human experience and expertise in a domain".

Generally speaking, a knowledge base represents a centralized repository of information, or a library of information relating to a certain field, problem or topic [3]. In IT domain, a knowledge base is almost always created in an electronic format and posted at a certain Internet address. It serves as a source providing individuals or organizations with knowledge of a specific problem. This is why a knowledge base is commonly regarded as a collection of useful information helping the users to improve the job they are doing or make it perfect, and therefore it is rightly believed to save companies both time and money [3, 4].

According to [5], from a knowledge provider's point of view, the e-learning process includes two key phases: designing e-learning materials and delivering and reviewing them.

Both phases (as well as all subphases) must be governed by standards, whose development and updating play a vital role in establishing an e-learning system and ensuring its proper functioning. Consequently, standardization organizations, both national and international, develop new standards almost on a daily basis in order to ensure the optimal use of all resources, and synchonization of all the elements involved in the e-learning process.

The aim of this paper is to examine the development trends of standards both at international and national levels. Apart from international (ISO) standards and Serbian (SRPS) standards, the standards published by standardization organizations in countries close to Serbia (Bosnia and Herzegovina, Croatia, Macedonia, Bulgaria, Montenegro, Albania, Hungary, Romania, Slovenia) are also analyzed. In addition to analyzing the trend of publishing standards at the national level of each of these countries, their comparison with international standards and their trends regarding both the number of published standards and their prices is performed as well. The analysis of the data obtained using statistical methods reveals the current status of national standards in relation to international ones, as well as their interrelationship.

[1] ISO/IEC 2382:2015(en): 2121399 (or: ISO/IEC 2382-1:1993(en): 01.06.18) - knowledge base

2. LITERATURE REVIEW

E-learning standards have been developed by the International Standardization Organization (ISO) and International Electrotechnical Commission (IEC). Besides these two, there are numerous other organizations, such as AICC, IMS, DCMI, ADL-SCORM, ALIC, IEEE LTSC, ADRIADNE, CEN/ISSS WS-LT, CEN/ISSS CDFS, CEN/ISSS WS on Privacy, W3C, etc. [6].

Standardization has covered 40 fields. Out of the total number of standardized fields, 30 fields belong to the domain of technical and technological sciences [7]. Of all the fields, the 35th one – Information technology and its sub-fields (Level 1 – ICS 1) [7, 8] has recorded the highest increase in the number of modernized standards (sources of knowledge). One of the groups within the Information technology field is 35.240 Applications of information technology (Level 2 – ICS 2). The next level, Level 3, comprises sub-groups, one of which is 35.240.90 IT applications in education, Including e-learning.

2.1. OVERVIEW OF NATIONAL AND ISO STANDARDS

This paper presents the status of e-learning standards published during the period from 2004 to 2017 at international and national levels. According to the international classification [9], ISO standards belong to the ICS 3=35.240.90 group (IT applications in education - Including e-learning), and so do HRN, BDS, MSZ and ASRO standards, whereas MKS standards relate both to 35.240.90 and 35.240.99. As to other national sets of standards (SRPS, BAS, MEST and SITS), their e-learning standards belong to ICS 3=35.240.99. A great number of these standards also relate to the ICS group 03.100.30 Management of human resources (e-learning from a human resource management point of view).

During the abovementioned period, a total of 122 standards were published (denoted by ∑lqp), and they are worth EUR 7,810.52 (denoted by ∑lv). The prices of all standards are expressed in euros for the purpose of easier comparison.
The following chapters provide a brief overview of the analyzed sets of standards during the period from 2004 to 2017.

2.1.1. Serbian –SRPS standards

During the period from 2004 to 2017, only six SRPS standards were published (∑lqp=6), belonging to the field 35 (ICS 1), group 240 (ISC 2), sub-group 99 (ICS 3). They all were published in 2013 and 2014. The total worth of these standards (∑lv) is EUR 149.34, and they are published on 286 pages [10].

2.1.2. Croatian – HRN standards

In Croatia, there are 9 HRN standards (∑lqp=9) in the field of e-learning (35.240.90), all published in 2014. The total worth of these standards (∑lv) is EUR 319.65, and they are published on 360 pages [11].

2.1.3. Bosnian – BAS standards

In Bosnia, there are 22 BAS standards (∑lqp=22) in the field of e-learning (35.240.99), all published in the period from 2010 to 2017. The total worth of these standards (∑lv) is EUR 804.73, and they are published on 933 pages [12].

2.1.4. Macedonian – MKS standards

In Macedonia, there are 6 MKS standards (∑lqp=6) in the field of e-learning (35.240.90 and 35.240.99), all published in the period from 2010 to 2015. The total worth of these standards (∑lv) is EUR 77.72, and they are published on 118 pages [13].

2.1.5. Bulgarian – BDS standards

In Bulgaria, there are 6 BDS standards (∑lqp=6) in the field of e-learning (35.240.90). The total worth of these standards (∑lv) is EUR 294.66, and they are published on 335 pages [14]. No standards had been published there before 2009.

2.1.6. Montenegrin – MEST standards

In Montenegro, there is only one MEST standard (∑lqp=1) in the field of e-learning (35.240.99), published in 2011. It is worth EUR 54.00 (∑lv), and published on 136 pages [15].

2.1.7. Albanian – SSH standards

In Albania, there are 3 SSH standards (∑lqp=3) in the field of e-learning (35.240.99), all published in 2012 and 2013. The total worth of these standards (∑lv) is EUR 110.02, and they are published on 144 pages [16].

2.1.8. Hungarian – MSZ standards

In Hungary, there are 8 MSZ standards (∑lqp=8) in the field of e-learning (35.240.90), none of which had been published before 2009. The total worth of these standards (∑lv) is EUR 237.83, and they are published on 367 pages [17].

2.1.9. Romanian – ASRO standards

In Romania, there are 11 ASRO standards (∑lqp=11) in the field of e-learning (35.240.90), none of which had been published before 2009. The total worth of these standards (∑lv) is EUR 141.16, and they are published on 475 pages [18].

2.1.10. Slovenian SIST standards

In Slovenia, there are 8 SIST standards (∑lqp=8) in the field of e-learning (35.240.99), the first of which was published in 2009. The total worth of these standards (∑lv) is EUR 600.00, and they are published on 456 pages [19].

2.1.11. International – ISO standards

There are 42 international ISO standards (∑lqp=42) in the field of e-learning (35.240.90). As

to the analyzed period, only in 2005, 2006 and 2010, no ISO standards were published. The total worth of the published standards (Σlv) is EUR 5,021.40, and they are published on 2,256 pages [20].

3. RESEARCH METHODOLOGY

The aim of this paper is to examine the development trends of standards belonging to the ICS 3 - 35.240.90(99) subgroup – IT applications in education/IT applications in other fields, Including e-learning at national levels, as well as to compare them with international standards, and determine the correlation between them. The data obtained using statistical methods are analyzed in order to determine the current status of national standards in relation to international ones, as well as their interrelationship, placing special emphasis on the status of Serbian SRPS standards in relation to standards in nearby countries and international ones.

First, the basic statistical values, such as the lowest and highest price, mean price, standard deviation, mode, median, etc. are determined within each individual set of standards and within the total number of standards. Special attention is given to the correlation between national and ISO standards regarding the number of standards and their prices. Then the data are grouped by price, and all the prices are expressed in euros for the purpose of easier comparison. As to these data, cumulative and relative frequencies are calculated for each individual set of standards, and then collectively. Some of the obtained results are also presented graphically, using lines and columns.

4. RESULTS AND DISCUSSION

4.1. Comparison of published standards

According to [10-19], the analysis of ICS 3 sub-group of standards in the field of e-learning clearly shows that none of the analyzed countries had published standards in this field before 2009, whereas the first ISO standard [20] in the same field was published in 2004. The relationship between the number of published national and international standards is graphically illustrated in Figure 1.

A graph can also be used to compare the prices of standards (Figure 2).

Figure 1 and Figure 2 clearly illustrate the difference between ISO standards on the one hand and all other analyzed sets of standards on the other hand regarding both their number and prices. According to these graphs, ISO standards are far more expensive than those published at national levels.

According to Figure 1, 9 HRN standards were published in 2014 and as many ISO standards were published in 2015, but their prices in these two years reached considerably different peaks (Figure 2). The price of 9 HRN standards published in 2014 was EUR 319.65, whereas the price of the same number of ISO standards published in 2015 was EUR 928.38. These data are sufficient to indicate significant differences between national and international sets of standards.

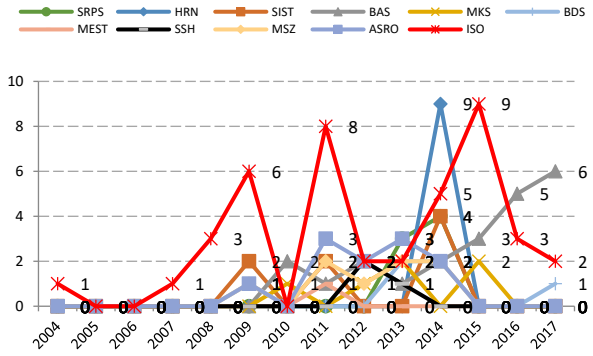

Figure 1. *An overview of all published standards (during the period from 2004 to 2017)*

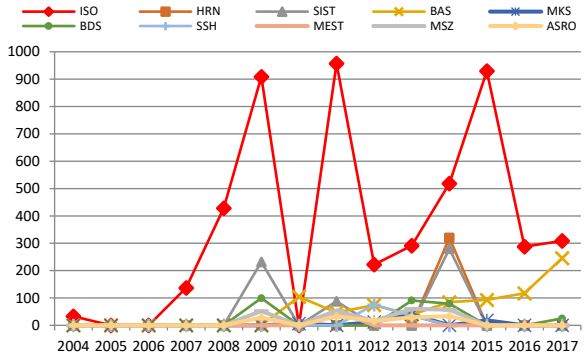

Figure 2. *An overview of the prices of all published standards (during the period from 2004 to 2017)*

For each of the analyzed years, the mean number of standards published both at international and national levels can be calculated, as well as the mean prices. These data are given in Table 1.

Table 1. *The mean number and price of standards for each year*

YEAR	Mean number	Mean price
2004	0.09	2.99
2005	0.00	0.00
2006	0.00	0.00
2007	**0.09**	**12.45**
2008	0.27	38.93
2009	**1.00**	**120.07**
2010	0.27	10.09
2011	**1.55**	**111.94**
2012	0.91	37.88
2013	**1.36**	**53.41**
2014	2.73	125.16
2015	**1.27**	**94.62**
2016	0.73	36.81
2017	**0.82**	**52.66**

According to Table 1, the mean number of published standards was the highest in 2014 (2.73), which is also the year when the mean price of published standards reached the peak (EUR

125.16). The data from the table are graphically illustrated in Figures 3 and 4.

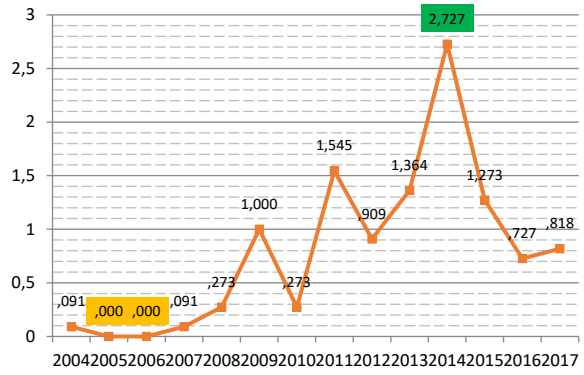

Figure 3 *The mean number of all national and international standards for each year*

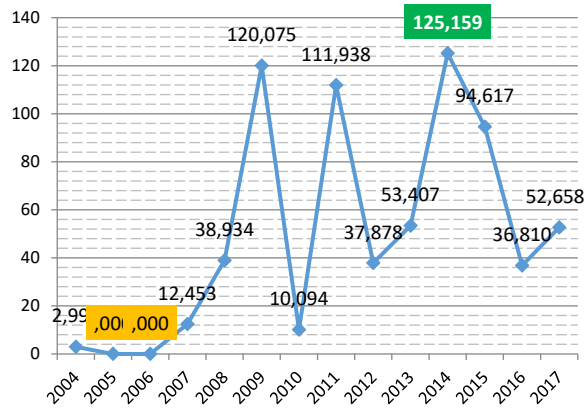

Figure 4 *The mean price of all national and international standards for each year*

4.2. Correlations between individual sets of standards

There are, obviously, certain correlations between national and international standards. They can be noticed both between the number of pages of the published standards and between their prices. These correlations can be further analyzed regarding the number of published standards and their prices during the entire period covered by this research (2004-2017).

4.2.1. The correlation between national and international standards regarding the number of published standards

The correlation obtained by the comparison of the number of standards published at national levels and the number of standards published at the international level is shown in Table 2.

Table 2. *The correlation between national and ISO standards regarding the number of published standards*

Designation of standards	SRPS	HRN	SIST	BAS	MKS
Number of standards	6	8	8	21	5
Correlation	0.1358	0.1961	0.5145	0.1613	0.2080

Designation of standards	BDS	MEST	SSH	MSZ	ASRO	ISO
Number of standards	6	1	3	8	11	42
Correlation	0.1387	0.4903	-0.1358	0.4308	0.3749	

4.2.2. The correlation between national and international standards regarding the price of published standards

The correlation obtained by the comparison between the prices of standards published at national levels and the price of international standards is given in Table 3.

As to the prices of published standards for each year, according to the data presented in Table 3, the correlation between ISO and ASRO standards is the highest, whereas the correlation between ISO and SSH standards is the lowest.

Table 3. *The correlation between national and international standards regarding the prices of published standards*

Designation of standards	SRPS	HRN	SIST	SIST	BAS	MKS
Price	149.338	319.645	8	600	804.716	77.7162
Correlation	0.0572	0.4677	0.5145	0.5160	0.0131	0.0844

Designation of standards	BDS	MEST	SSH	SSH	MSZ	ASRO	ISO
Price	294.659	54	3	110.02	237.836	141.155	5021.43
Correlation	0.3196	0.4915	-0.1358	-0.1644	0.5150	0.5300	

The correlation between national and international standards regarding both the number and prices of published standards can also be graphically illustrated, as shown in Figure 5.

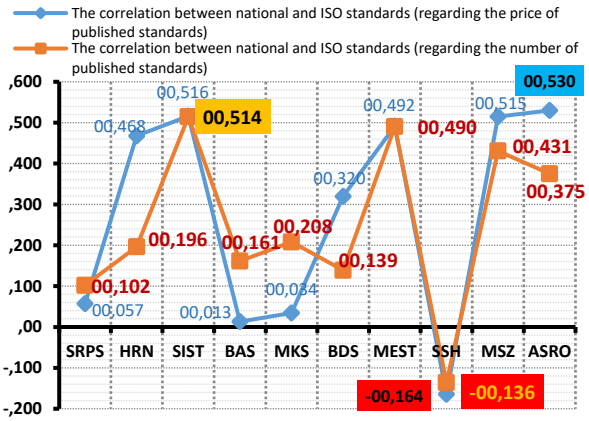

Figure 5. *Graphical illustration of the correlation between national and ISO standards*

4.2.3. The correlation between the number of pages and price within individual sets of standards

In a similar manner, the relationship between the number of pages and the price of published standards can be analyzed for each set of standards (Table 4).

Table 4. *The correlation between the number of pages and price of published standards*

Designation of standards	SRPS	HRN	SIST	BAS	MKS
Number of standards	6	8	8	21	5
Price	149.34	319.65	600	804.72	77.716
Correlation	0.9559	0.0984	0.9899	0.9355	0.9782

Designation of standards	BDS	MEST	SSH	MSZ	ASRO	ISO
Number of standards	6	1	3	8	11	42
Price	294.66	54	110.02	237.84	141.16	5021.43
Correlation	0.9916	-	0.9998	0.9788	0.6777	0.6777

In this case, however, SSH standards have the highest correlation between the number of pages and the price of standards, whereas this correlation is the lowest in MEST and HRN sets of standards. As there is only one MEST standard, the correlation is 0 and therefore cannot be taken into consideration. These data can be graphically illustrated, as shown in Figure 6.

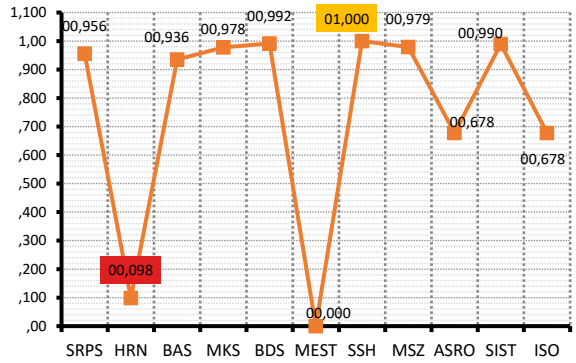

Figure 6. *Graphical illustration of the number of pages and prices of published standards*

4.3. The analysis of the sets of standards using the measure of central tendency and measure of variability

Table 5 provides an overview of the basic statistical analyses performed with each set of standards (national and international). It shows the total number of standards (in the given period of time), the highest and lowest price of standards per set, the arithmetic-geometric mean of the prices, mode, median, standard deviation, variance and the sum of prices for each analyzed set of standards.

From Table 5 it can be seen that SSH standards have the smallest standard deviation (the measure of spread from the mean price of standards), whereas the largest standard deviation is calculated within the set of ISO standards. The relationship between the arithmetic mean and median of prices (the highest and lowest price) can also be analyzed and illustrated graphically, as shown in Figure 7.

Figure 7 shows that ISO standards have the highest mean price, reaching even EUR 119.56, whereas at national levels, Slovenian SSH standards are the most expensive, with the mean price of EUR 75.00. As to the countries bordering Serbia, MEST standards in Montenegro and BDS standards in Bulgaria have the highest mean price, which is EUR 49.11 in each country. The mean price of SRPR standards, is EUR 24.89, which is significantly lower than the mean prices of standards in most of the countries in the region, but not the lowest. The mean price of e-learning standards is the lowest in Romania, where ASRO standards can be bought at a mean price of EUR 12.83.

4.4. Grouping data

The analysis of the prices of standards [10-20] clearly shows that they can be grouped into price ranges, and then further statistically analyzed in order to calculate the cumulative and relative frequency distribution.

The price range for each set of standards is defined using the already determined highest and lowest prices and the number of standards in each set. For example, as there are 6 SRPS standards (N=6), the number of ranges (K) is obtained using the following equation:

$$K = 1 + 3{,}3 * \log N. \qquad (1)$$

Using the equation (1), the following number of ranges (K) is obtained: K=3,568 ≈ 4 (almost 4 ranges), whereas their width is calculated using the following equation:

$$\frac{X_{max} - X_{min}}{K}, \qquad (2)$$

where X_{max} and X_{min} denote the highest and the lowest price, respectively, within the analyzed set of standards.

Using this equation, the following range width is obtained: 8.7345≈9. Based on the obtained ranges, the following can be calculated: arithmetic mean, frequency (the number of standards in the analyzed range), cumulative and relative frequency (expressed in %), and the diagram of the cumulant can be created (Table 6).

Table 6. *Grouping SRPS standards*

Interval		Arithmetic mean of the interval	Frequency	Cumulative frequency	Decreasing cumulant	Relative frequency %	Cumulative frequency %
8	17.99	12.995	2	2	6	33	33
18	27.99	22.995	1	3	4	17	50
28	37.99	32.995	2	5	3	33	83
38	47.99	42.995	1	6	1	17	100
			6			100	

Table 5. *Statistical analyses*

		SRPS	HRN	SIST	BAS	MKS	BDS	MEST	SSH	MSZ	ASRO	SIST	ISO
	Number of standards	6	8	8	21	5	6	1	3	8	11	8	42
	Maximum (price)	43.18	52.44	116.00	77.71	25.09	99.57	54.0	42.59	52.20	28.48	116.00	171.66
	Minimum (price)	8.25	28.91	44.00	19.43	6.73	25.20	54.0	32.83	16.22	1.45	44.00	13.87
Measures of central tendency	Mean price	24.89	39.96	75.00	38.32	15.54	49.11	54.0	36.67	29.73	12.83	75.00	119.56
	Geometric mean	21.83	39.24	70.44	36.21	14.22	43.58	54.0	36.44	28.08	10.57	70.44	108.14
	Mode	-	34.96	44.00	34.77	-	-	-	-	30.54	-	44.00	119.64
	Median	25.05	37.99	68.00	34.77	15.30	39.49	54.0	34.60	28.61	11.10	68.00	119.64
Measures of variability	Varijance	158.37	66.17	815.14	194.90	46.91	791.85	-	27.04	124.18	51.93	815.14	1550.31
	Standard deviation	12.58	8.13	28.55	13.96	6.85	28.14	-	5.20	11.14	7.21	28.55	39.37
	Sum	149.34	319.65	600.00	804.72	77.72	294.66	54.0	110.02	237.84	141.16	600.00	5021.43

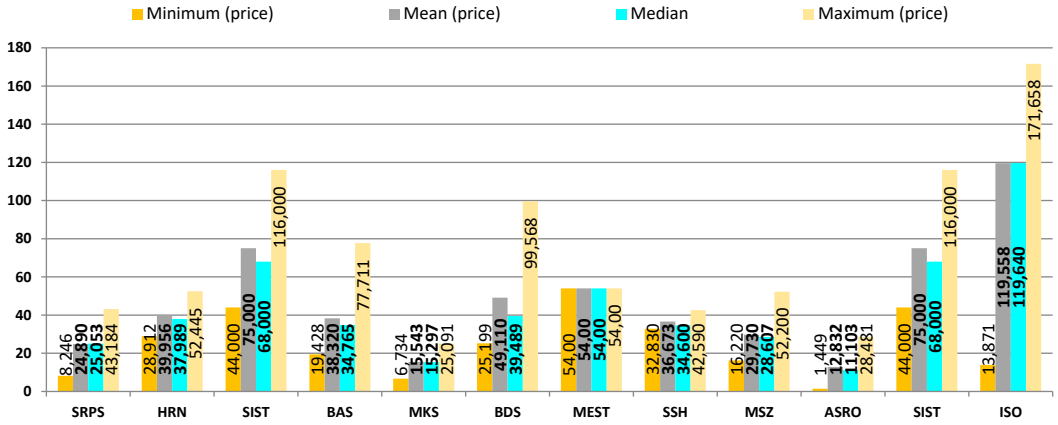

Figure 7. *Graphical illustration of the lowest, mean, and highest price of standards and the median*

Using the obtained data, the following diagram of the cumulant is created for SRPS standards (Figure 8).

Using the data presented in Table 6, the diagram of the relationship between cumulative and relative frequency (%) can also be created, as shown in Figure 9.

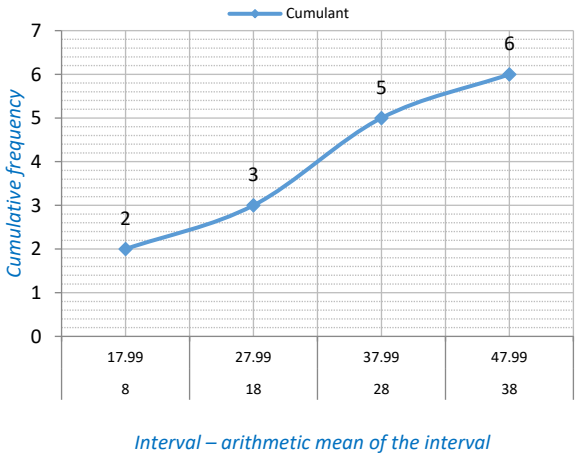

Figure 8. *Graphical illustration of the cumulant for SRPS standards*

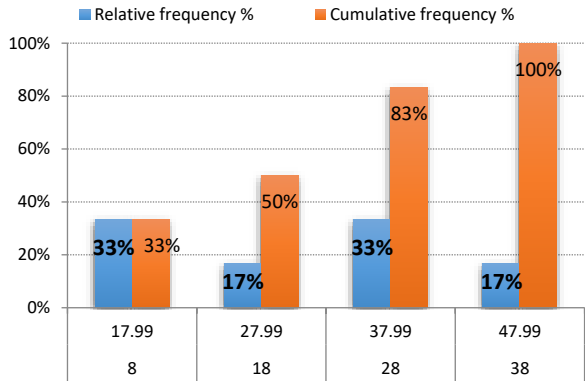

Figure 9. *Graphical illustration of the relationship between cumulative and relative frequency of SRPS standards*

As to SRPS standards, Figures 8 and 9 show that the greatest number of the standards (33%) belong to the first price range (8-17.99), and the same percentage of standards belong to the third range (28-37.99), which means that most SRPS standards can be bought at prices ranging from EUR 8.00 to EUR 18.00, i.e. from EUR 28.00 to EUR 38.00.

The same procedure is used to obtain data for other sets of standards, as described below:

– most HRN standards can be bought at prices ranging from EUR 12.00 to EUR 24.00, as even 33% of the standards published in the analyzed period belong to this very price range;

- most BAS standards can be bought at prices ranging from EUR 24.00 to EUR 36.00, this being the range to which 41% of the published standards belong;
- most MKS standards are grouped in two ranges. The first range (0-7.99) and the third one (8-15.99) include 33% of standards each, which leads to the conclusion that most MKS standards published in the analyzed period can be bought at less than EUR 16.00;
- most BDS standards, 67% precisely, belong to the first price range (25-44.99), which means that most BDS standards can be bought at less than EUR 45.00;
- as to MEST standards, as there is only one standard published in the field of e-learning, no further statistical analyses can be performed;
- most SSH standards, 67% precisely, belong to the first price range (32-36.99), which means that most SSH standards published in the analyzed period can be bought at less than EUR 37.00;
- as to MSZ standards, the first price range (16-25.99) and the second one (26-35,99) include the greatest percentage of standards, i.e. 38% each, and therefore they can be bought at less than EUR 36.00;
- the prices of most ASRO standards published during the analyzed period, 55% precisely, belong to the second price range (7-12.99), which means that most ASRO standards can be bought at prices ranging from EUR 7.00 to EUR 13.00;
- as to SIST standards published during the analyzed period, most of the standards, i.e. 38%, belong to the first price range (43-61.99), and therefore most SIST standards can be bought at prices ranging from EUR 43.00 to EUR 62.00;
- as to ISO set of standards, which has the greatest number of standards published in the analyzed period, most standards belong to two price ranges. Namely, 26% of those standards belong to the following range: 105-127.99, and the same percentage of standards belong to the last price range (151-173.99). This means that most international standards in the field of e-learning can be bought at the prices ranging from EUR 82.00 to EUR 128.00, i.e. from EUR 151.00 to EUR 174.00.

In the same manner, the prices of all standards published at both national and international levels can be grouped. This implies the creation of group price ranges, which would include all sets of standards, taking into consideration the highest price of standards (x_{max}= EUR 171.66, which is the price of an ISO standard) and the lowest price (x_{min}= EUR 0.00, as there are free standards in certain sets). Based on these data and the total number of standards (N=122), using the equation (1), the following number of ranges is obtained K=7.88≈8. The width of these eight ranges is calculated using the equation (2), and it is 21.45≈22. The data obtained in such a manner are given in Table7.

Table 7. *Grouping all standards*

Interval		Arithmetic mean of the interval	Frequency	Cumulative frequency	Decreasing cumulant	Relative frequency %	Cumulative frequency %
0	22.99	11.50	26	26	122	21	21
23	45.99	34.50	40	66	96	33	54
46	68.99	57.50	11	77	56	9	63
69	91.99	80.50	7	84	45	6	69
92	114.99	103.50	8	92	38	7	75
115	137.99	126.50	19	111	30	16	91
138	160.99	149.50	5	116	11	4	95
161	183.99	172.50	6	122	6	5	100
			122			100	

Based on the data presented in Table 7, a diagram illustrating the relationship between the arithmetic mean and cumulative frequency can be created, as shown in Figure 10.

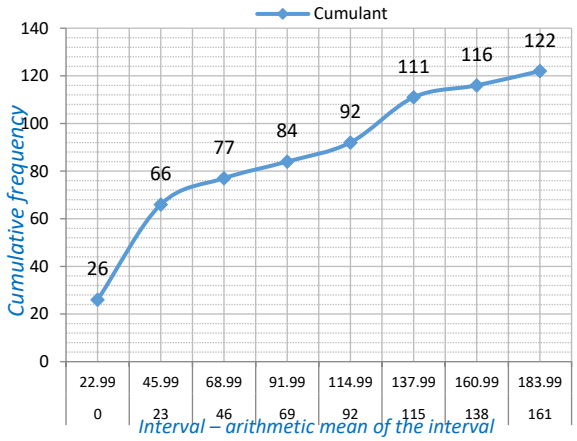

Figure 10. *Graphical illustration of cumulants for all standards*

Using the same data, a diagram showing the relationship between relative and cumulative frequency can be created as well (Figure 11).

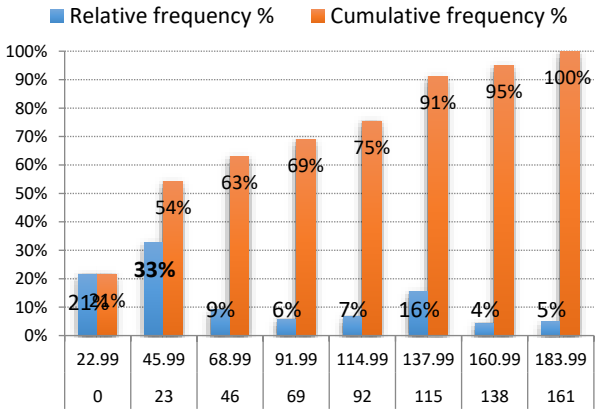

Figure 11. *Graphical illustration of the relationship between relative and cumulative frequency of all standards*

The diagram shows that, during the period from 2004 to 2017, the prices of most standards in the

analyzed sets published both at national and international levels, i.e. 33%, belong to the second price range (23-45.99), which means that most of the standards published in the abovementioned period can be bought at the prices ranging from EUR 23.00 to EUR 46.00.

5. CONCLUSION

According to the data presented in chapter 4.1, it can be concluded that the total number of standards belonging to ISC 3=35.240.90(99) sub-group which were published during the given time (2004-2007) in the countries included in the research was ∑lqp=122, 80 of which were developed at national levels, and 42 by international organizations. The total worth (∑lv) of these 122 standards is EUR 7667.17, whereas ISO standards are worth EUR 5021.43. Globally speaking, most standards, i.e. 30 of them, were published in 2014, mostly at national levels (25 national and 5 international), and they cost EUR 1376.75. This is also the year when the most expensive standards were published and therefore the highest mean price recorded (EUR 125.16).

The comparison performed between the individual sets of standards on the one hand and between each set and ISO standards on the other hand shows that the correlation between Slovenian SIST standards and ISO standards regarding the number of standards is the highest, whereas the correlation between Albanian SSH standards and ISO standards is the lowest. As to the prices, the correlation between Romanian ASRO standards and ISO standards is the highest, and again the correlation between Albanian SSH standards and ISO standards is the lowest. With regard to the correlation between the number of pages and the prices of standards, the situation is quite different. Namely, SSH standards have the highest correlation between the two, whereas Croatian HRN standards have the lowest correlation.

The description of the sets of standards using the measures of central tendency, variability and standard deviation shows that SSH standards have the smallest deviation from the mean, whereas the greatest values of standard deviation are recorded in the set of ISO standards.

Data grouping into price ranges shows that the most expensive standards in the field of e-learning are ISO standards, most of them belonging to the range of high prices (EUR 105-127.99, i.e. EUR 151-173.99). As to the national standards, SSH standards are the most expensive, and the greatest percentage of them (even 67%) cost between EUR 32.00 and EUR 37.00, whereas their mean price is EUR 36.67. SRPS standards are among the cheapest ones in the region. Out of the total number of SRPS standards, 33% belong to the price range from EUR 8.00 to EUR 18.00, and their mean price is EUR 24.89. The situation is similar with MKS standards, whereas the cheapest standards are ASRO standards (even 55% of them belong to the price range from EUR 7.00 to EUR 13.00). The mean price of ASRO standards is EUR 12.83. Speaking about the countries bordering Serbia, MEST standards in Montenegro, and Bulgarian BDS standards have the highest mean price, which is EUR 49.11. The analysis of the price per page for each examined set of standards reveals that the price of ISO standards per page is the highest (the price per page = EUR 2.227). As to national standards, Slovenian standards have the highest price per page (the price per page = EUR 1.316), whereas this price is the lowest in Romania (the price per page = EUR 0.297).

The price ranges into which the prices of all the standards are grouped show that most of the standards published during the period from 2004 to 2017, i.e. 33% of the total number of standards, belong to the range from EUR 23.00 to EUR 46.00. According to the abovementioned, there appear to be significant inconsistencies between national and international standardization organizations, especially regarding the number of published standards in the field of e-learning. Since 2014, the year when most of the standards were published, the number of published standards has been falling instead of increasing, and the same trend will probably continue.

However, the trend should change in the future, and the number of national standards should increase due to the growing popularity of e-learning, which demands new standards to govern the field. The accreditation of a growing number of e-learning modules and entire study programs based solely on e-learning is expected in the following period. Their optimal growth and development require knowledge sources – standards and regulations to govern the whole process. Currently, the number of published standards is insufficient, both in Serbia and countries near it.

REFERENCES

[1] International standard, ISO/IEC 2382:2015 (en), *Information Technology – Vocabulary*, 2015.

[2] International standard, ISO/IEC 2382-1:1993, *Information Technology – Vocabulary*, 1993.

[3] *http://searchcrm.techtarget.com/definition/knowledge-base* , accessed: January 2018.

[4] https://www.helpscout.net/helpu/knowledge-base-examples/ , accessed: January 2018.

[5] Đelošević, N. (2010). LMS u E-učenju, *Univerzitet u Kragujevcu*, 145010-TEMPUS-2008-RSJPHES-ETF-JP-00059-2008, Kragujevac,*http://projects.tempus.ac.rs/attachments/project_resource/424/510_145010%20LMS%20MANUAL%20RESURS.pdf*

[6] Micić, Ž., Blagojević, M. (2016). Standards for e-learning in Serbia – development and application, *XXII Conference–Development*

Trends: "New Technologies in Education", Zlatibor.
[7] Micić, Ž., Tasić, D., Debeljković, D. (2017). Izvori znanja u standardizovanim oblastima TT-nauka za ekspertize u procesima akreditacije, *XXIII skup trendovi razvoja: "Položaj visokog obrazovanja i nauke u Srbiji"*, Zlatibor,http://www.trend.uns.ac.rs/stskup/trend_2017/radovi/T5.1/T5.1-2.pdf
[8] Micić, Ž., Ružičić, V., Tasić, D. (2017). Intenzitet inoviranja znanja u visokom obrazovanju na platform standardizacije, *XXIII skup trendovi razvoja: "Položaj visokog obrazovanja i nauke u Srbiji"*, Zlatibor, http://www.trend.uns.ac.rs/stskup/trend_2017/radovi/T1.2/T1.2-3.pdf
[9] *International Classification of Standards, 2nd edition* (2009), posted on the website of the Institute for Standardization of Serbia at the following address: http://www.iss.rs/rs/, accessed in: January 2018.
[10] *Institute for Standardization of Serbia*, http://www.iss.rs/rs/, updated in January 2018, accessed in: January 2018.
[11] *Croatian Standards Institute*, http://31.45.242.218/HZN/Todb.nsf/Web_Prikaz_Rezultata?OpenForm&Seq=1, updated in January 2018, accessed in: January 2018.
[12] Institute for Standardization of Bosnia and Herzegovina, http://www.bas.gov.ba/standard/?ics_id=&classification_id=&national_committee_id=&directive_id=&status_natstd_id=0&standard_code=&title=&ics_text=35.240.99&directive_text=&national_committee_text=&from_date=&to_date=&Submit=Tra%C5%Bei, updated in January 2018, accessed in: January 2018.
[13] *Standardization Institute of the Republic of Macedonia,*http://www.isrm.gov.mk/en/standard/advance_search.php*,* updated in January 2018, accessed in: January 2018.
[14] *Bulgarian Institute for Standardization,* http://www.bds-bg.org/, updated in January 2018, accessed in: January 2018.
[15] *Montenegrin Institute for Standardization*, https://www.isme.me/, updated in January 2018, accessed in: January 2018
[16] *General Directorate of Standardization - Albania,* https://www.dps.gov.al/, updated in January 2018, accessed in: January 2018.
[17] *Hungarian Standards Institution,* http://www.mszt.hu/web/guest/home, updated in January 2018, accessed in: January 2018.
[18] *Romanian Organization for Standardization,* http://www.asro.ro/?page_id=499, updated in January 2018, accessed in: January 2018.
[19] *Slovenian Institute for Standardization,* http://members.sist.si/norm/default.aspx, updated in January 2018, accessed in: January 2018.
[20] *International Organization for Standardization – ISO*, https://www.iso.org/ics/35.240.90/x/, updated in January 2018, accessed in: January 2018.