

# Comparative analysis of the use of open source software in teaching of data processing

Klara Rybenska, Josef Sedivy and Lucie Kudova

**Abstract**— Commonly used tool for processing of statistical data in the research and teaching of the humanities and natural sciences program IBM SPSS. This tool is an unwritten standard not only for many school systems, but also for many state institutions in the Czech Republic, which make available statistical data in the form of programs SPSS. The big disadvantage of this program is the high price, which is very restrictive for use in an academic environment, whether in the classroom and in the case of individual student work on their computers and also for their possible future practice. Currently, there are two tools that could replace the proprietary software. These are programs SOFA (<http://www.sofastatistics.com>) and PSPP (<http://www.gnu.org/software/pspp/>), which are free and available under a license that allows these programs to install and use not only in academia, but also for possible future commercial use of students in this software will learn.

The research aims to compare options and tools SOFA PSPP with IBM SPSS program and see if you can incorporate alternative tool in the teaching of science and the humanities so that students had the opportunity to apply learned knowledge and skills into their own projects and in future practice without having to pay expensive fees for the use of software.

**Keywords**—IBM SPSS, SOFA, PSPP, Statistical data, Software statistical data processing, Sciences, Social Sciences

## I. INTRODUCTION

Software IBM SPSS Statistic is widely used by the Faculty of Arts in the field of Sociology and the Faculty of Social Work at the Institute of Social work. The Faculty of Science, this software is not used, it is replaced by other programs and MatLab and R. These softwares are in the fields of science greatly valued for accurate calculations and quality of scientific results. Program includes IBM SPSS Statistics in sociology and social work unwritten standard and is the most widely used of these professions. Neither state institutions in the Czech Republic remain with the use of this software behind and make available statistical data in a format suitable for proprietary program SPSS. The Faculty of Education is in the doctoral study program Information and communication technology in education is used NCSS software. In other fields is preferably used Microsoft Office Excel. SPSS Program is its control interface and maximum flexibility to users in the humanities. It is also one of the reasons why in this area is widely used. Outcomes of this program are generally recognized by the professional community.

Research methods that are most commonly used fall within the descriptive statistics, which IBM SPSS program full control. Widespread is also testing hypotheses. In our research, we

interviewed each user what software most commonly used for processing of statistical data (Fig 1).

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## Use of statistical software on selected Faculties

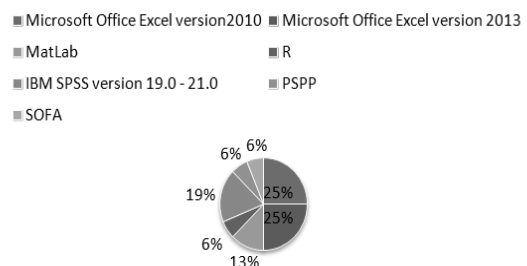


Fig 1 Graph showing the frequency of use of statistical software to selected faculties of the University of Hradec Králové (source: authors).

The most common reasons that lead teachers to teach the preferred software we investigated using questionnaires and interviews with teachers in selected faculties of the University of Hradec Králové. Total interviewed 25 teachers (including external teachers) from different faculties. The data was tabulated and the resulting graph (Fig 2).

Among the most commonly cited reasons teachers why they prefer that their software for statistical data processing were that their software can use to future students in their future careers, they have your software installed on your own computer or the software is easy to use.

This information helped us with finding suitable alternatives to paid software IBM SPSS Statistics, where we conducted our research. It is important to offer as compensation for such software, which will have a user- friendly interface, you will not need him again tediously familiar, and his license will allow it to be used not only in schools, in universities in teaching science and social disciplines, but also on personal computers teachers and students. To ensure future possible business use.

Why teachers prefer selected software in education?

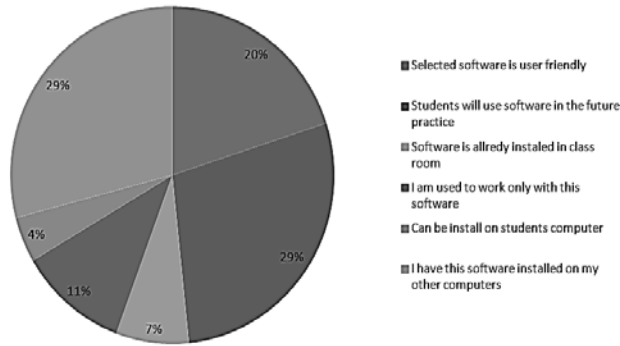


Fig 2 Graph showing the reasons for teachers to teach specific software. Prompting the user to select multiple options (source: authors).

The aim of the research was to test the software with open source licenses. These are programs SOFA and PSPP that have been tested in the most used statistical methods and compared with the proprietary program SPSS to determine whether it is possible to integrate these tools into the free teaching of science and the humanities and fully or at least the vast majority to replace paid professional software SPSS.

II. GENERAL DESCRIPTION OF TESTED SOFTWARE

A. IBM SPSS Statistics

This is a paid professional set of tools suitable for data analysis from planning and gathering of information processing, the reporting of the processed results. The software is primarily intended for analysts, programmers of statistical applications, but also for the whole specialized enterprises dealing with statistical data analysis. The program is also suitable for students who are engaged mainly in the exploration of statistical science disciplines. The selection provides a comprehensive set of fully integrated modules. Is it possible to find and specialized functions that are useful for the implementation of various statistical surveys on which you can make better decisions in social and economic areas. But the software is paid a license model allows only a certain kind of rent [1]. Despite this lack provides the user with the most important analytical features a range of simple and advanced statistical procedures developed in such a way as to best meet the needs of the work of researchers [2].

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	77,000 <sup>a</sup>	70	,265
Likelihood Ratio	43,389	70	,995
N of Valid Cases	11		

a. 88 cells (100,0%) have expected count less than 5. The minimum expected count is ,09.

Symmetric Measures

	Value	Approx. Sig.
Nominal by Nominal Phi	2,646	,265
Cramer's V	1,000	,265
N of Valid Cases	11	

a. Not assuming the null hypothesis.  
 b. Using the asymptotic standard error assuming the null hypothesis.

Fig 3 Sample Chi-square created in IBM SPSS Statistics (source: authors)

Software tools provides an overview of the data and accelerates summary of the results in different outputs, in which the user can export their data (to name as text files, Microsoft Word, PDF, Excel, image, JPEG, PNG, BMP and others). The software is fully functional for OS Microsoft Windows and Linux distributions [3].

B. SOFA - Statistics Open For All

SOFA is a user-friendly program that can be used for basic statistical analysis of the data with a single output. This is one of its greatest strengths. The program allows the user to see very fast results while offering the opportunity to immediately prepare to share. This software can be used to create any reports or spreadsheets to run basic statistical tests such as Pearson's test, Mann-Whitney test or T-test. Despite some shortcomings offers the user the ability to connect to each data stored in MySQL, MS Access or Microsoft SQL databases. Program SOFA provides, inter alia, the outputs in the form of common types of graphs (Fig 5-histogram) [4]

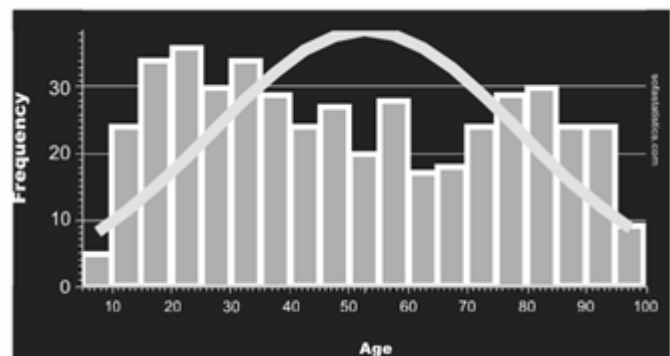


Fig 5 Sample histogram created in SOFA. (Source: authors)

Program SOFA can not be regarded as completely intuitive, but it has a very well developed website that offers the user maximum support. These web pages contain instructions in written and video form [4], [5].

Software can be installed on Linux distributions, Mac OS, and of course on Microsoft Windows. This program, unfortunately I can not import many formats such as IBM SPSS. Nevertheless it is still one of those software, which could be applied in the teaching of statistical methods different scientific disciplines.

C. PSPP

This free program designed for statistical analysis of the selected data is still in development. I still paid SPSS great competition, mainly because it was by SPSS program designed to replace it. PSPP program follows the IBM SPSS Statistics features and largely also due. Software allows you to prepare a variety of tests, analysis of variance, Cronbach's alpha and is very suitable for the analysis of large data sets because it is able to process data very quickly [5].

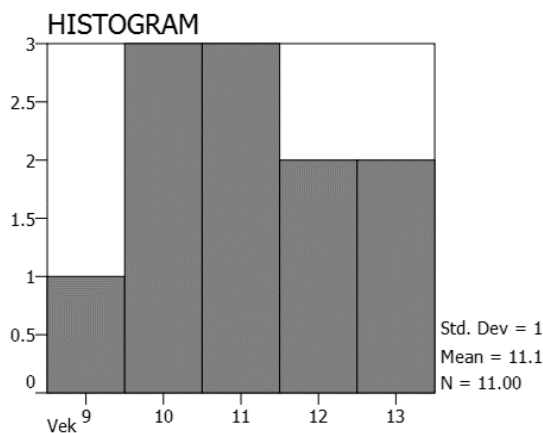


Fig 6 Sample Histograms of the PSPP (source: authors)

Graphs (Fig 6, an example of the histogram), which the user creates a program, you can convert them to standard formats (PostScript, PNG) and then convert the entire file into a text file, PDF, HTML, SVG, or OpenDocument format [6]. Unlike the SOFA PSPP can open and import the Excel spreadsheet and even allows you to choose from a single table data, indicating that the user is working [7].

III. OPEN SOURCE SOFTWARE TESTING AND PERFORMANCE FOCUSED ON DESCRIPTIVE STATISTICS

A. SOFA - Statistics Open For All

Descriptive Statistics

Descriptive statistics is a prerequisite that open source statistical program must meet in order to use it for teaching various disciplines on statistics, whether in science or humanities fields. It is a discipline that gathers information and then summarizes and processed in the form of graphs and tables. It also calculates the numerical characteristics of the data (for example, mention the mean, variance, percentiles, range, etc.) and allows people to communicate essential information about a given set of data, without the need to transmit all this data. Types of descriptive statistics is chosen accordingly, what we kind of variable.

The descriptive statistics are most commonly used functions: arithmetic mean, standard deviation, maximum, minimum span, mode, median and graphical representations of data (histogram and box plot Fig 7).

Graf

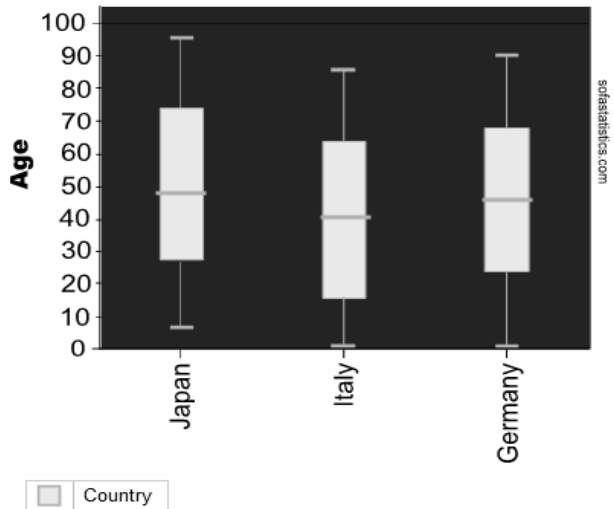


Fig 7 Showcase a box chart the SOFA (source: authors)

For this reason, we research on the above-mentioned functions also focused and tested whether individual software meet these requirements. Software that these requirements are largely fulfilled, I can not, can not be a good candidate to replace paid software IBM SPSS which meets the above minimum.

Software SOFA meets the required function descriptive statistics. The user can choose whether to display all of these features, or some of them. With this program you can also freely change the color scheme and display the resulting table (Fig 8). SOFA is able to quickly create a histogram and box plot. Thanks to the properties graphically edit individual color schemes and the resulting table, we can evaluate this program as well as a convenient tool for creating presentable-looking results that can be later used for example in presentations or publications.

Tabulka

		Jmeno										
		Andrea	Eva	Jana	Jirka	Kvido	Ludmila	Marie	Pavel	Petr	Sara	Vilem
Vaha_Kg	Mean	46.0	48.0	48.0	42.0	40.0	44.0	50.0	40.0	45.0	45.0	50.0
	Mean	13.0	10.0	12.0	9.0	11.0	12.0	10.0	10.0	11.0	11.0	13.0
Vek	Mean	130.0	128.0	135.0	125.0	130.0	148.0	130.0	125.0	120.0	145.0	152.0
	Median	130.0	128.0	135.0	125.0	130.0	148.0	130.0	125.0	120.0	145.0	152.0
	L. Quartile	130.0	128.0	135.0	125.0	130.0	148.0	130.0	125.0	120.0	145.0	152.0
	U. Quartile	130.0	128.0	135.0	125.0	130.0	148.0	130.0	125.0	120.0	145.0	152.0
Vyska_Cm	N	N=1	N=1	N=1	N=1	N=1	N=1	N=1	N=1	N=1	N=1	N=1
	Std Dev	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Sum	130.0	128.0	135.0	125.0	130.0	148.0	130.0	125.0	120.0	145.0	152.0
	Min	130.0	128.0	135.0	125.0	130.0	148.0	130.0	125.0	120.0	145.0	152.0
	Max	130.0	128.0	135.0	125.0	130.0	148.0	130.0	125.0	120.0	145.0	152.0
Range	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

Fig 8 Sample processing functions required descriptive statistics in the SOFA. (Source: authors)

**Tests of normality**

To test for normality of data used so-called goodness of fit tests, where it is firstly the Pearson chi -square test (hereinafter Pearson test) which is used to test the null hypothesis and test allows random selection (even different from a normal distribution). To test for normality can be used as well as other tests, such as Kolmogorov -Smirnov or Shapiròv - Wilk test of goodness of fit. It is also possible to use tests based on skewness and kurtosis. Goodness is the method of mathematical statistics, which allows to verify that the random variable a predetermined probability distribution or not.

The described tests allow for specialized statistical software such as SPSS. However, with the unpaid versions of statistical programs are not available to the same extent as in commercial software.

SOFA allows the user to perform only the Pearson test (Fig 9). Other tests of appointed SOFA can not perform.

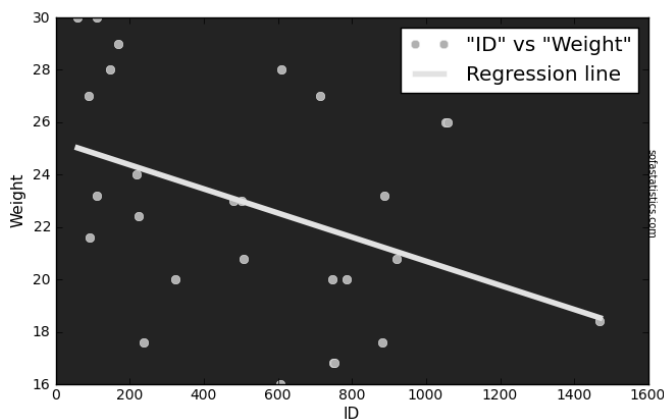


Fig 9 Pearson's test the SOFA. (Source: authors)

**Chi - square**

Chi square is the probability distribution that the statistics used very often.

It is very important for determining whether a set of data conforms to the function or not. It is also used to determine if the data sample corresponds to the assumed distribution and whether the observed ratio coincides with the theoretical and expected values.

Software SOFA provides the necessary tools and chi-square is able to create (Fig 10).

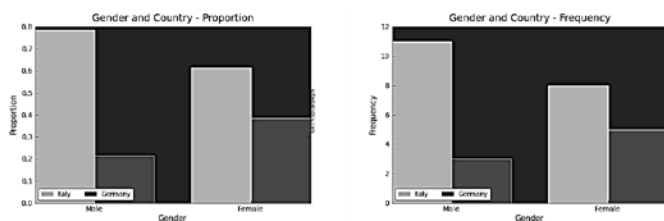


Fig 10 Chi-square processed using the SOFA software. (Source: authors)

**T-test**

T-test is one of the methods of mathematical statistics, which allows you to verify that a normal distribution, which comes

from a random sample has a specific mean value, the variance is unknown. Also, it helps to determine whether the two normal distributions having the same (even if unknown) scattering from which originate two independent random samples have the same mean value.

T-test is also often used to compare whether the measurement results in one group differs significantly from the measurement results of the second group. SOFA offers the user to perform an independent T-test or paired t-test (Fig 11).

**Results of Paired Samples t-test of "ID" vs "Weight"**

p value: < 0.001<sup>1</sup>

t statistic: 7.1

Degrees of Freedom (df): 26

Group	N	Mean	Standard Deviation <sup>2</sup>	Min	Max
ID	27	537.037	374.608	59.0	1469.0
Weight	27	22.822	4.29	16.0	30.0

<sup>1</sup> If p is small, e.g. less than 0.01, or 0.001, you can assume the result is statistically significant i.e. there is a difference.

<sup>2</sup> Standard Deviation measures the spread of values.

Fig 11 T-test conducted in the SOFA software. (Source: authors)

**Non-parametric tests**

These tests are used to compare the statistical data on which it is not possible to assume a normal probability distribution of the reference character. These tests examine the null hypothesis, which concerns only the general properties of the distribution of monitored variables in statistical files.

Mann-Whitney test is a nonparametric test that is used to assessing whether two independent samples of observations come from the same distribution. This test can assess whether any of the independent samples of greater value than the other. The program can SOFA Mann-Whitney test (Fig 12) allows also perform Kruskal-Wallis test.

**Results of Mann Whitney U Test of "ID" for "Italy" vs "Germany"**

Two-tailed p value: 0.313<sup>1</sup>

U statistic: 57.0<sup>2</sup>

z: 1.009

Group	N	Median	Avg Rank	Min	Max
Italy	19	608.0	15.0	59.0	1469.0
Germany	8	369.5	11.625	110.0	749.0

Fig 12 Mann-Whitney test executed in the SOFA. (Source: authors)

**Reliability**

The statistical value indicates the reliability of the assay and can be understood as a relative absence of measurement errors. It accuracy, consistency of measurements, or in other words the ability to achieve the same result when measuring the state of the course of the observed change. Cronbach's

alpha is a statistical coefficient of internal consistency, which determines the reliability or internal consistency and reliability of its level. It takes values between 0 and 1, where the value of 0.7 or more indicates a high consistency and reliability. Program SOFA reliability can not perform.

**Correlation**

Correlation is a relationship between two variables or processes, while changing one variable, changing correlatively the other. If the two processes show correlations are likely to depend on each other. The results of the correlation itself but can not be deduced if one of the processes causing the other effect.

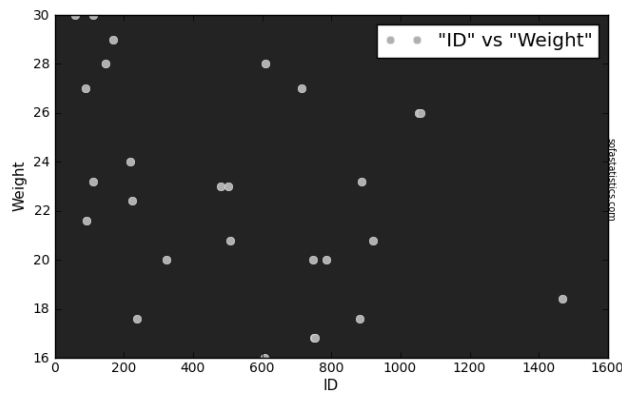
Spearman's rank correlation coefficient is a dimensionless number that indicates the statistical dependence (correlation) between two variables.

Pearson's correlation coefficient is a parametric statistical test that assumes a normal distribution. Figuring out how close is the relationship variables and whether the direction of this relationship is positive or negative.

Software Testing, SOFA (Fig 13, Fig 14) contains tools for performing Spearman and Pearson tests and meets the requirements for the implementation of the correlations.

**Results of Spearman's Test of Linear Correlation for "ID" vs "Weight"**

p value: 0.023<sup>1</sup>  
 Spearman's R statistic: -0.435  
 Degrees of Freedom (df): 25



<sup>1</sup> If p is small, e.g. less than 0.01, or 0.001, you can assume the result is statistically significant i.e. there is a relationship.

Fig 13 Spearman's test performed using the SOFA. (Source: authors)

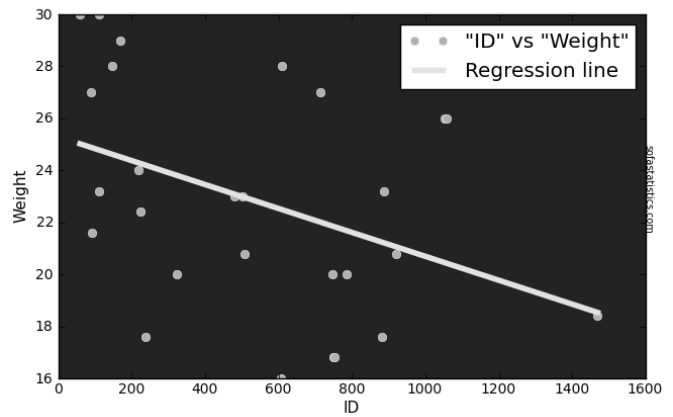


Fig 14 Pearson's test performed using the SOFA. (Source: authors)

**Factor analysis**

This statistical method is used to explain the variance of the observed variables, using a small number of latent variables (called factors). The purpose here is to measure something that is not possible to measure directly. Factor analysis attempts to describe each observed variable as a combination of the effects of individual factors. The more factors is calculated, the greater the percentage of variance of variables can be explained. An example of the use of factor analysis research conducted in the fields of humanities, for example, measuring political orientation.

Factor analysis software SOFA can not be performed.

**IV. PSPP**

Test requirements which have been imposed on the open source program, and their respective functions are described in detail in the previous chapter. Likewise, the description of this product was mentioned above, it is not necessary to repeat it. For this reason, here we focus only on the description of the desired functions, which should test program ideally meet and simplified, so if it is satisfied or not. At the same time present in the text of the results we have achieved with software PSPP.

**A. Summary of results of analysis of the PSPP**

**Descriptive Statistics**

Program PSPP has met all the descriptive statistics, which have to cope with statistical software. Program offers more than SOFA kinds of graphs and even if does not change the color scheme or heterogeneous view the resulting table (Fig 15), works much faster than software SOFA. Its use is very user friendly, because thanks to strong form with IBM SPSS its use is intuitive.

Valid cases = 11; cases with missing value(s) = 0.

Variable	N	Mean	S.E. Mean	Std Dev	Variance	Range	Minimum	Maximum	Sum
Vek	11	11,09	,39	1,30	1,69	4,00	9,00	13,00	122,00
Vyska	11	137,09	3,26	10,82	117,09	32,00	120,00	152,00	1508,00
Vaha	11	42,09	1,69	5,59	31,29	17,00	35,00	52,00	463,00

Fig 15 Sample processing functions required descriptive statistics in the PSPP. (Source: authors)

**Tests of normality**

PSPP addition to Pearson's test also provides tests based on kurtosis (Fig 16). Further tests normality (for example Kolmogorov-Smirnov test) as found thru our new research software PSPP can perform.

Vek

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
	9,00	1	9,09	9,09	9,09
	10,00	3	27,27	27,27	36,36
	11,00	3	27,27	27,27	63,64
	12,00	2	18,18	18,18	81,82
	13,00	2	18,18	18,18	100,00
<b>Total</b>		<b>11</b>	<b>100,0</b>	<b>100,0</b>	

Vek

<i>N</i>	<i>Valid</i>	11
	<i>Missing</i>	0
<i>Kurtosis</i>		-,88
<i>Skewness</i>		,13

Fig 16 Sample output test based on kurtosis the PSPP. (Source: authors)

**Chi-square**

PSPP provides the tools necessary to create the chi-test (Fig 17). This program allows the user to quickly test process itself, but also allows the test results saved in several formats (PDF, HTML, OpenDocument, etc.) or directly printed.

Vyska

	Observed N	Expected N	Residual
120,00	1	1,10	-,10
125,00	2	1,10	,90
130,00	1	1,10	-,10
135,00	1	1,10	-,10
138,00	1	1,10	-,10
144,00	1	1,10	-,10
145,00	1	1,10	-,10
146,00	1	1,10	-,10
148,00	1	1,10	-,10
152,00	1	1,10	-,10
<b>Total</b>	<b>11</b>		

Vaha

	Observed N	Expected N	Residual
35,00	1	1,38	-,38
36,00	1	1,38	-,38
38,00	1	1,38	-,38
40,00	3	1,38	1,63
42,00	2	1,38	,63
48,00	1	1,38	-,38
50,00	1	1,38	-,38
52,00	1	1,38	-,38
<b>Total</b>	<b>11</b>		

Test Statistics

	Vyska	Vaha
Chi-Square	,82	2,82
df	9	7
Asymp. Sig.	1,00	,90

Fig 17 Chi-square processed using software PSPP. (Source: authors)

**T-test**

The program allows PSPP T-test (Fig 18). Sample is on the following figure.

T-TEST

PAIRS = Vek WITH Vyska (PAIRED)  
/MISSING=ANALYSIS  
/CRITERIA=CIN(0.95).

Paired Sample Statistics

	Mean	N	Std. Deviation	S.E. Mean
Pair 0 Vek	11,09	11	1,30	,39
Vyska	137,09	11	10,82	3,26

Paired Samples Correlations

	N	Correlation	Sig.
Pair 0 Vek & Vyska	11	,33	,32

Paired Samples Test

	Paired Differences				t	df	Sig. (2-tailed)	
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair 0 Vek - Vyska	-126,00	10,46	3,15	-133,03	-118,97	-39,95	10	,00

Fig 18 T-test processed software PSPP. (Source: authors)

**Non-parametric tests**

PSPP can perform nonparametric tests too.

**Reliability**

For all unpaid programs only program PSPP can perform Cronbach's alpha (Fig 20).

**Reliability Statistics**

Cronbach's Alpha	Part 1	Value	NaN
		N of Items	0
	Part 2	Value	,15
		N of Items	2
	Total N of Items		2
Correlation Between Forms			NaN
Spearman-Brown Coefficient	Equal Length		NaN
	Unequal Length		NaN
Guttman Split-Half Coefficient			,00

Fig 20 Cronbach's alpha processed software PSPP. (Source: authors)

**Correlation**

PSPP includes tools to perform Spearman and Pearson's test and meets the requirements for the implementation of the correlations (Fig 21).

Correlations

		Q.1a Názor o obci – lidé přátelští	Q.1b Názor o obci – důvěra mezi lidmi
Q.1a Názor o obci – lidé přátelští	Pearson Correlation	1,00	,58
	Sig. (2-tailed)		,00
	N	998	998
Q.1b Názor o obci – důvěra mezi lidmi	Pearson Correlation	,58	1,00
	Sig. (2-tailed)	,00	
	N	998	998

Fig 21 Showcase correlation using software PSPP. (Source: authors)

**Factor analysis**

Factor analysis can perform software PSPP (Fig 22).

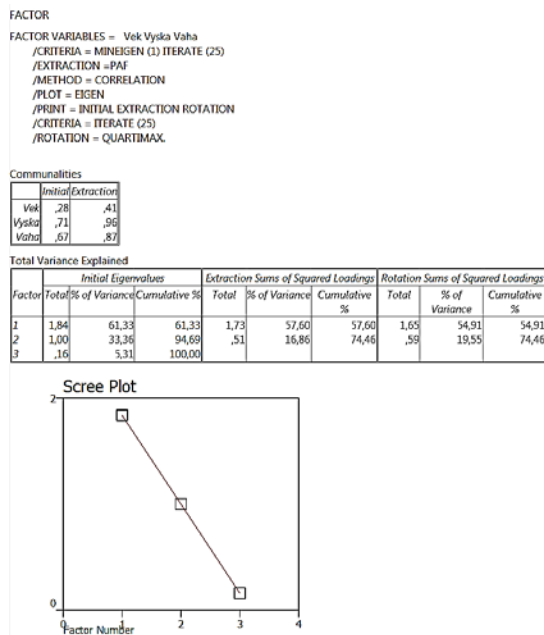


Fig 22 Factor analysis in the PSPP. (Source: authors)

## V. SUMMARY OF RESULTS

In the research study we verify the functionality of each test software. Paid, professional software IBM SPSS Statistics meets all requirements. The program, which has completed most of the required features is open source PSPP. The worst hit of the tested software program SOFA - Statistics Open For All. Summary of individual functions and their performance shown in the table below (Fig 23).

Software	IBM SPSS Statistics	SOFA	PSPP
<b>Software Requirements</b>			
<b>descriptive Statistics</b>	Yes	Yes	Yes
<b>normality test</b>	Yes	Yes	Yes
<b>Chi-square</b>	Yes	Yes	Yes
<b>T-test</b>	Yes	Yes	Yes
<b>Non-parametric tests</b>	Yes	Yes	Yes
<b>Reliabilita</b>	Yes	No	Yes
<b>correlation</b>	Yes	Yes	Yes
<b>factor analysis</b>	Yes	No	Yes

Fig 23 The resulting table functionality of the various test programs. (Source: authors)

As you can see on Table (Fig 23) we can suggest, that the expected substitute of proprietary IBM SPSS software would be open source PSPP. This program can be recommended for education of statistics. It's a good alternative of proprietary software IBM SPSS Statistics. Program PSPP is very similar to the frequently used paid program SPSS. The test results are that the PSPP software with their capabilities and user-friendly software environment is most close to IBM SPSS Statistics (Fig 24).

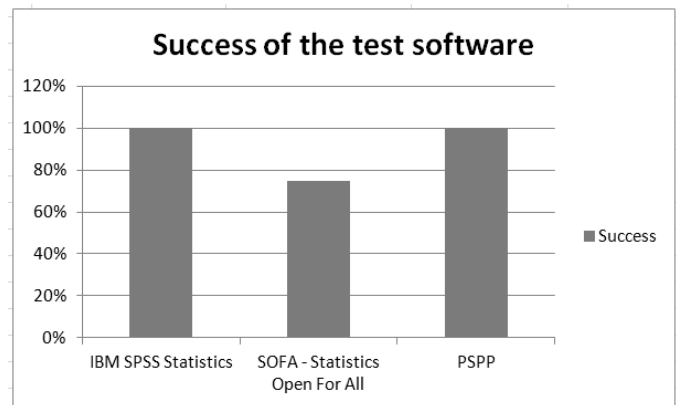


Fig 24 Graph showing the percentage of tested software. (Source: authors)

## VI. CONCLUSION

The research that we brought, examines programs for statistical processing of data that is used to teach science and humanities faculties at the University of Hradec Králové. Research has proven that paid software IBM SPSS Statistics is a quality software for teaching students and teachers to use. This software is difficult in its comprehensive functionality to replace. The world's leading statistical software designed not only for businesses, government organizations as well as research organizations, academia, offers a comprehensive set of tools and functions for the most important analytical solution to a wide spectrum of issues not only in companies but also in research and academia. No problems thus manages to perform the required tasks. Its major drawback is the high price but in addition also the way of installation, which is tedious and not always flawless. It is therefore not recommended to install any user. It is usually necessary to use to assist with the installation of an administrator or advanced user who can manage to decide what kind of installation for the company to perform. The best candidate for his replacement was selected through a comparative analysis of the PSPP program for the following reasons:

Software can be fully used in the teaching of subjects and statistical processing of statistical data for free and also very easy to install, you can handle almost anyone as user-friendly service program. Software SPSS replicate the look, which we see as another example, particularly for those users who wish to move from the paid software and do not want to bother with getting to know different and often very different graphical interface. PSPP is a sound statistical program, which has all the required functions. Software PSPP is still in development, so it is expected that once fully functional replacement for SPSS and will more than fulfill all of these desired features. Second investigation software, SOFA, not in this research clearly recommended. Although the program handles many functions such as PSPP, but much more required functions can not cope (factor analysis, Cronbach's alpha, Kolmogorov - Smirnov and Shapiro - Wilk test of goodness of fit tests based on skewness and kurtosis). Although the appearance of the output data from the program is in a sense a representative in our research, this fact is not relevant.

In a solution would be for the user to use for their work both open source programs (SOFA for example to obtain graphically interesting outputs), but this seems to us due to the fact that PSPP fully meets the main requirements as redundant.

The aim of the research was to compare between them overall program options PSPP a SOFA with the IBM SPSS Statistics and determine in what areas, and whether it would be at all possible to replace one of these programs, unpaid, paid program. Research has shown that it is possible to replace the IBM SPSS, even it is important to expected that may not be able fulfill with all requirements, because some users may have more stringent requirements than those we have placed us on our test.

But due to zero tariffs and use PSPP software on any computer, including at home, and also with regard to the possibility of commercial use of the program, it can be clearly recommended in teaching both of Sciences and humanities fields requiring statistical data processing with the prospect of future exploitation software students in their employment and training activities.

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