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# Selection of Appropriate Statistical Methods for Research Results Processing

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The purpose of the article is to provide an algorithm that allows choosing a valid method of statistical data processing and development of a model for acquiring knowledge about statistical methods and mastering skills of competent knowledge application in various research activities. Modelling method is a leading approach to the study of this problem. It allows us to consider this issue as a targeted and organized process of application of the author's methodology for the selection of appropriate statistical method for the efficient processing of the research results. The article showcases an algorithm that allows to choose an appropriate method of statistical data processing: general algorithm of statistical methods application in scientific research, statistical problems systematization based on which there have been outlined conditions for specific research methods application. To make a final decision concerning the statistical method at the stage of data received and statistical tasks of the research defined, it is proposed to use an author's algorithm that allows to competently select the method of processing the research results.

*Keywords*: statistical processing of the research results, statistical methods, research, statistical criteria, algorithm

## INTRODUCTION

Nowadays there is continuously growing demand of the researchers for the statistical data analysis, their need for statistical methods to be applied in statistical data processing.

The works of many scholars are dedicated to the statistical methods (Glantz, 1998; Glass and Stanley, 1976; Cochran 1976; Urbach, 1975; Hollender, 1983). These methods are one of the major, generic methods of modern science, which are applied in various subject areas.

A large scope of statistical data processing methods causes a problem of adequate comparison, correlation and synthesis of different research results. Incorrect choice of a method of the experimental data analysis can lead to erroneous conclusions,

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incorrect interpretation of the research results, and thereby distort or even lead to the loss of the scientific value of such research results and the loss of informativity.

Currently, for example, there is a problem of choosing the most effective statistical method, which implies mainly defining the characteristics of each method, a list of requirements to information and statistics. In this regard, it is important not only to acquire the relevant knowledge of statistical methods, but to improve the skills of applying this knowledge in various research activities.

Up to date, there are different interpretations of the "statistical methods" concept; we will dwell on most common ones. Statistical methods are some of the methods of the applied mathematical statistics used for the processing of the experimental results (Vocational Education, 1999).

At the present day, all kinds of statistical methods are used in various academic fields, depending on the experimental data and the tasks that the researcher has to solve.

For example, in modern demography statistical methods are used mainly in four areas: to obtain information on population and demographic processes, including these processes reconstruction using incomplete data set; to process data and provide statistical description of the demographic processes; to analyze the demographic patterns and socio-demographic relations; to consolidate the characteristics of the demographic processes and calculate some aggregates of reproduction and population movement.

In demography statistical methods are extensively applied in the study of demographic processes versus specific socio-economic factors. For this purpose correlation and regression analyses are used (for example, correlation between fertility or nuptiality and living conditions, etc.). To put it differently, we study the correlation between the characteristics: individuals or families (households), groups of population or subpopulations.

In statistics, we distinguish the most commonly applied statistical methods among the existing ones: descriptive statistics; design of experiments; sampling; hypothesis testing; regression, correlation and factor analysis; time series analysis; statistically specified tolerances; analysis of the measurements accuracy; statistical process control; Statistical control of processes; reliability analysis; analysis of the causes of nonconformities; process capability analysis.

In economics, the application of statistical methods plays an important role, as it is dealing with the processing and analysis of vast amounts of information on socio-economic phenomena, in turn, economic studies solve the problem of identifying the factors that determine the level and dynamics of the economic process. Notably, it is economic statistics that studies the quantitative characteristics of the mass phenomena and processes in the economy by means of analysis and statistical data processing. Its main methods are descriptive, analytical and comparison methods.

In psychology, there are the following areas of statistical methods application: 1) descriptive statistics, including the grouping, tabulation, graphical representation and a quantitative description of the data; 2) the theory of statistical inference used in psychological research to predict the results of the samples survey (inductive statistics); 3) the experimental design theory serves to detect and verify the causal relationships between variables (analytical statistics).

Statistical methods are profoundly and widely used in biology and medicine. In biology, there are research areas dedicated to the application of statistical methods in biology; it comprises biometrics, biostatistics; in medical science statistical methods are used for the analysis of experimental data and clinical observations, biomedical statistics. In ecology they also apply statistical methods – methods of variation statistics allowing to explore the whole (e.g., phytocenosis, population, productivity) in its particular population (e.g., using data obtained at survey sites) and to assess the degree of the results accuracy.

In history using various statistical data methods one can trace the dynamics of the society development, changes in its population, social background, political opinion, economic conditions, and so on. For example, the area of agro-historical research is the widest field of factor analysis application (Litvak, 1985). Cliometrics that appeared in the late 1950s and has been developing ever since is an area in the historical studies, suggesting the systematic use of statistical and mathematical methods. In addition, statistical methods have been successfully used in archeology to decipher the inscriptions in ancient languages.

Statistical methods are most widely used in criminology thanks to Y.D. Bluvshtejn (1981), namely in the criminological statistics and legal statistics: criminal and administrative legal statistics. Here, statistical methods allow a comprehensive qualitative analysis of the legal quantitative phenomena: 1) to give a numerical rating of the condition, level, structure and dynamics of crime and law enforcement combating it, that is to answer the questions about a current situation (descriptive function); 2) to identify statistical relationships, regularities in condition, structure and dynamics of crime, as well as in law enforcement, that is to explore to a certain extent the causes of a particular situation (explanatory function); 3) to identify trends in the development of crime, to make statistical criminological forecast, that is to envisage at least approximately what is expected, what are the prospects (predictive function); 4) to identify the "worrying" signs in the characterization of crime, positive features and shortcomings in the work of law enforcement bodies, "bottlenecks", vulnerabilities (low level of crime detection, lengthy periods and low quality of the investigation and court proceedings etc.) (organizational, administrative function).

Statistical methods in Cultural Studies are most clearly manifested in the quantum-wave (monadic) theory and content analysis of culture; for example, there is a number of research methods specifically designed for political texts analysis, such as the method of cognitive mapping, a method of semantic differential.

As for the literary criticism the statistical methods are used for the attribution of anonymous and pseudonymous works, and also to determine: the evolution of the writer's style, which helps to clarify the chronological sequence of his works in the absence of dates; vocabulary of literary works, morphological categories. In 2013, A. G. Nikolayev and M. P. Degtyareva (2013) solved the problem of unambiguous identification of literary texts based on the plot study with the help of the systemic analysis of the text object involving the use of statistical methods for identifying texts subjects, methods of systemic analysis, graph theory , functional analysis.

Statistical methods are widely used not only in the above mentioned but in other scientific fields as well. The major types of statistical methods are general-purpose methods, methods applied in accordance with the needs of a particular area of activity, the methods of statistical analysis of specific data. Applicable scope of specific statistical methods is much less than of general-purpose methods, but its importance in analyzing a particular situation is much greater. Scientific results, the significance of which is estimated in accordance with general scientific criteria, correspond to the general-purpose works, as for the works focused on the analysis of specific data it is essential to ensure successful solution of specific problems in a particular area of application (economics, sociology, medicine, history, criminology, etc.). Meanwhile, regardless of the application sphere, it is necessary to correctly apply statistical methods while implementing scientific research, thus guaranteeing scientifically valid and reliable results of data processing.

## METHODOLOGICAL FRAMEWORK

A model of acquiring knowledge of statistical methods and mastering skills of competent knowledge application in a variety of scientific research areas is

proposed for consideration. That model, in turn, is the system. The system represents an integrity composed of individual elements and connections between them. It includes following components: motivational, content-related, procedural and evaluative. The model also incorporates appropriate procedures for the selection of statistical methods for the efficient processing of the research results (Ganieva et al., 2014; Zaripova et al., 2014; Masalimova & Nigmatov, 2015).

It is necessary to single out motivational component because the mastery of knowledge and skills is not only the result but also the purpose. Here, the aspiration to prepare for the scientific and professional activities can serve as the main motives of conscious learning associated with awareness of its objectives.

It is advisable to use the following approaches in order to teach statistical methods and develop their ability to make an appropriate choice:

1. Methodological, having an effect on goals and learning process.
2. Systemic, which affects both the content and the process of learning.
3. Activity-algorithmic approach influencing the processual aspect of learning.
4. Process-oriented approach affects the learning process, primarily carrying out experiments and statistical studies.

The methodological approach basically represents a scientific cognition method, peculiarities of which are exemplified by the historical-scientific material. This approach defines the purpose of learning: introduction to the scientific cognition method, acquirement of certain research skills. Experiment and scientific research are used in training statistical methods in accordance with this approach. Thus, the methodological approach also affects the learning process.

Activity-algorithmic approach contributes to the development of statistical methods teaching process. From the perspective of the activity approach the objectives of training statistical methods are formulated with the help of tasks, activities and methods, when the task is a situation in which you need to reach a certain goal, the activities are the process of achieving the goal, and the method is the way to implement activities.

According to the theory of A. N. Leontiev (1959), *the need - the purpose - the conditions and correlating with them activities - actions - operations* are the principal elements of the activity. Any activity is carried out involving various methods (ways), so the statistical scientific method comprises several techniques. Statistical research techniques include the steps of collecting, processing and presenting research results.

Techniques for statistical materials processing are heavily tied to the use of algorithms. The application of the algorithms in the learning process was studied by B. V. Biryukov (1974), L. Lund (1966), N. Rosenberg (1979), and others. An algorithm is an incremental description of mechanically step by step performed uniform and relying on a finite set of rules procedure for solving the problem. In training statistical research methods algorithms are used in the form of regulations to address the educational tasks with a provision of operational procedure (algorithm). Each algorithm serves as a model following which the student registers his knowledge of a particular studied portion of educational material and thereby labels it as learned.

An algorithmic approach is implemented through examining the order of evaluation of statistical indicators using formulas. Algorithms elaboration is possible through both inductive and deductive ways. In the first case, students study a formula, divide it into constituent parts (formula analysis), and then combine the actions (synthesis). In the second case, the formulae are derived from the task set, they define the steps to solve it (analysis of the problem), and then derive the formula (synthesis).

The training of statistical methods is carried out sequentially:

- Setting targets of certain skills formation (motivation, emotional conviction)

and the adoption of these targets (the formation of demands and interests), the teacher explains the purpose of the method, its capabilities, holds heuristic conversation.

- Instruction on the content and methods of activities aimed at mastering the training skills: teacher explains the procedure: to choose statistical methods, to choose formulas - the order of calculations following the selected formula - interpretation of the results.
- Practical exercises to simulate the activities – students solve common tasks.
- Monitoring of skills formation progress: teacher checks the acquisition of the studied method using Q&A sessions, tests, etc. The application of the acquired skills in a variety of practical situations: students solve statistical problems that have different questions wording, conduct statistical experiments.
- Consolidation of skills and independent application of the obtained skills - students perform statistical research working individually from the initial stage of project development to presenting the results.

A systematic approach is an area in the methodology of scientific cognition and social practice, which is based on approaching the objects as the systems, focusing research on disclosing the integrity of the object, on identifying the diverse types of bonds within it and consolidating them into a common theoretical picture. The content of statistical methods training is developed on the basis of a systematic approach, so that according to I. Y. Lerner's concept (Lerner, 1981), content of education is pedagogically oriented system of knowledge, work methods, experience of creativity and emotional and sensory education, assimilation of which facilitates personality formation.

According to the provisions, as reflected in the writings of psychologists and educators L. S. Vygotsky (1986, 2012), E. N. Kabanova-Meller (1981), V. A. Krutetskaya (1972), V. V. Krajewski (1977) and others, systematicity of training is one of the quality indicators. Only consistent, systematic knowledge and skills lay the ground for successful acquisition of ideas and regularities, which in turn serve as basis for the beliefs, ability to apply theoretical knowledge in practice.

By systemic mastering of statistical methods we understand gradual familiarization of students with the function, content and application of methods, systematic exercises of methods application, conscious use of methods as the training techniques in the educational activities.

This approach is implemented through the establishment of interconnection between knowledge, experience of creative activity and the value attitude to the studied phenomena and processes. Knowledge is developed following the next pattern: the identification of new knowledge – defining the scope of application of the previously learned - identifying new interconnections between the old and the new – building generalized knowledge.

Every new statistical method is implemented on the basis of the previous one. For example, the study of the correlation is not possible without mastering the methods of studying the variations of the characteristic, and the study of variations is impossible without a study of averages, and so on.

I. Y. Lerner (1981) defines the following conditions ensuring the quality of knowledge: the amplitude of knowledge types, the systematic application of knowledge, the generalization of knowledge, a gradual increase in the complexity of knowledge and methods of using them, the importance of knowledge and educational activities for students.

Process-oriented approach implies that the process of scientific research is of a top priority. Here we can outline the following principles of designing the content of training skills to make appropriate choice of statistical methods of the research:

1. The principle of the content compliance with the level of modern statistical

methods and one's own research.

2. The principle of consideration the integrity between the content and processual aspects of education.

3. Structural coherence of the education content at different levels of its formation from general to more specific one.

It is crucial to take experience into account: creative activities and emotional and value relationships. Creative activity experience has a specific content and is characterized by the following features:

1. Independent application of knowledge and skills in a new situation.

2. The vision of the new challenges in a familiar situation.

3. Independent compilation of the already known method of work to elaborate a new one.

4. Development of a fundamentally new way of addressing the issues.

Experience of the statistical methods application is acquired gradually: familiarization with the individual elements of statistical methods, the formation of a systemic knowledge about statistical methods, and conscious application of the methods in different situations. Repeated application of statistical methods in different situations (standard, modified, new) allows us to approach a statistical method from different perspectives, apply it to different objects. This gives a student an opportunity to select essential features of the statistical method, and thus, apply it in different situations.

Experience of emotionally-valuable relation to statistical work includes attitudes, beliefs, and values. This experience includes the motives of activity, moral problems, which are reflected in the students' behavior. In the process of statistical generalization and analysis the students develop their own attitude to the phenomenon, understand the operations made. Otherwise, they disengage from the educational process; students make operations mechanically, which significantly reduces the effectiveness of the training.

Further, we will dwell on the method of choosing appropriate statistical methods necessary for the successful development and implementation of the scientific research.

## RESULTS

It should be noted that the statistical methods of data analysis are used in virtually all areas of human activity. They are used whenever necessary to obtain and justify any judgments about the group (of objects or subjects) with some internal heterogeneity.

It is expedient to distinguish three kinds of scientific and applied activities in the field of statistical methods of data analysis (by the degree of specificity of the methods involving a specific absorption in the problem):

a) development and study of general purpose methods without considering specificity of applications;

b) development and analysis of statistical methods and models of real phenomena and processes in accordance with the needs of a particular area of activity;

c) the application of statistical methods and models in the statistical analysis of specific data.

We will briefly examine the three newly identified types of scientific and applied activities. As it goes from a) to c) the scope of a particular statistical method application narrows, but this increases its value for a particular situation analysis.

If the scientific results, the significance of which is estimated by the general scientific criteria, correspond to the works of type **a),** then for the works of type **c)**

the basic task is the successful solution of specific problems of a particular field of application (engineering and technology, economics, sociology, medicine, etc.).

Works of type b) occupy an intermediate position, because on the one hand, a theoretical study of the properties and statistical methods and models developed for specific applications can be quite complex and mathematicized, and on the other hand, the results are not of general interest and could be relevant only for a team of field-oriented specialists. We can say that type of work b) is aimed at solving common tasks of specific application.

It should be noted that methods of descriptive statistics are mainly classified as type a), methods of analytical statistics are referred to as types b) - c) correspondingly.

Here is a general **algorithm** for statistical methods application in scientific research:

1) to formulate a hypothesis on the basis of the problem of scientific research;

2) to determine the number of parameters required for study (the nature of the tested statistic attribute, data type, the type of distribution);

3) to define statistical objectives of the study;

4) to apply statistical methods to the selected parameters, taking into account the statistical objectives of the study;

5) first draw a statistical conclusion and then make the experimental observations.

The main **statistical objectives** of the study (phase 3) are:

a) identification of differences in the level of the studied statistic feature;

b) identification of the significance and direction of the shift in the level of the studied feature;

c) identification of differences in the distribution of the statistical feature;

d) identification of the coherence between changes of statistical features;

d) identification of a statistical characteristic changes under the influence of controlled conditions (factors);

e) distribution of the objects of universe general population into a relatively homogeneous groups;

g) analysis of survival data.

The decision on the choice of statistical method of research results processing at the stage when the data have already been received (stage 4) can be made as follows: 1) to determine the type of statistical problem (a) ÷ x)) corresponding to a particular research field; 2) to apply the algorithm for choosing the statistical method.

Initially we systematize statistical tasks and statistical methods applied to them.

For that purpose we introduce a list of symbols:

$F$ – Fisher variance ratio;

$G$ – sign test;

$H$ – Kruskal-Wallis test;

$L$ – Page's trend test;

$Q$ – Rosenbaum's q-test;

$S$ – Jonckheere's trend test;

$T$ – Wilcoxon T test;

$t$ – Student's t-test;

$U$ – Mann – Whitney U-test;

$\chi^2$ – chi-square test;

$\chi^2_r$ – Friedman test;

$\lambda$ – Kolmogorov–Smirnov test;

$\varphi^*$ – Fisher's angular transformation

$r_{xy}$ – Pearson correlation coefficient,;

$r_s$ – Spearman's rank correlation coefficient;

$R$ – biserial correlation test;
$\tau$ – Kendall tau rank correlation coefficient;
$\varphi$ – Pearson coefficient.

Based upon the analysis of the literature we established the following relationship between the statistical problems tackled in the research, conditions and statistical methods applied to research results.

**Table 1.** Relationship between statistical tasks addressed in research, conditions and statistical methods applied to them

| **Tasks** | **Conditions** | | **Methods** |
|---|---|---|---|
| a) identifying differences in the level of the studied statistical feature | Two sampling populations | feature is distributed normally | Tests: $t$, $F$ |
| | | feature distribution is different from normal | Tests: McNemar, $m$, $Q$, $U$, $\chi^2$, $\varphi^*$ |
| | Three and more sampling populations | | Tests: $\chi^2$, $S$, $H$ |
| b) identification of the significance and direction of the shift in the level of the studied feature | two measurements on one and the same sample population | feature is distributed normally | Tests: $t$, $F$ |
| | | feature distribution is different from normal | Tests: $T$, $G$, $\varphi^*$ |
| | 3 and more measurement (treatment methods etc. | feature is distributed normally | repeated measures analysis of variance |
| | one and the same sample population | feature distribution is different from normal | Tests: $\chi^2_r$, $L$ |
| b) identification of differences in the distribution of the statistical feature | when comparing the empirical distribution with the theoretical one | | Tests: $\chi^2$, $\lambda$ |
| | when comparing two empirical distributions | | Tests: $\chi^2$, $\lambda$, $\varphi^*$ |
| d) identification of the coherence between changes of statistical features | two features | | correlation analysis ($r_{xy}$, $\tau$, $r_s$, $R$, $\varphi$), paired regression analysis |
| | three and more features | | correlation analysis ($r_{xy}$, $r_s$, multiple and partial correlation), multiple regression analysis, factor analysis and cluster analysis |
| e) identification of a statistical characteristic changes under the influence of controlled conditions (factors) | under the influence of one factor | | Критерии ($S$, $L$, $H$), однофакторный дисперсионный анализ, множественное сравнение независимых выборок |
| | under the influence of two factors simultaneously | | two-factor variance analysis |
| | under the influence of three and more factors (search for hidden causes) | | factor analysis |
| f) distribution of the studies objects into a relatively homogeneous groups | Groups are predefined | | discriminant analysis |
| | Groups are not predefined | | cluster analysis |
| g) analysis of survival data (comparative analysis of efficiency) | Two sampling populations, one feature | | Tests: Gehan's, Logrank test |
| | Two sampling populations, two features | | Cox's proportional hazards model, regression analysis |

Below is original **algorithm of statistical method selection** (Figure 1).

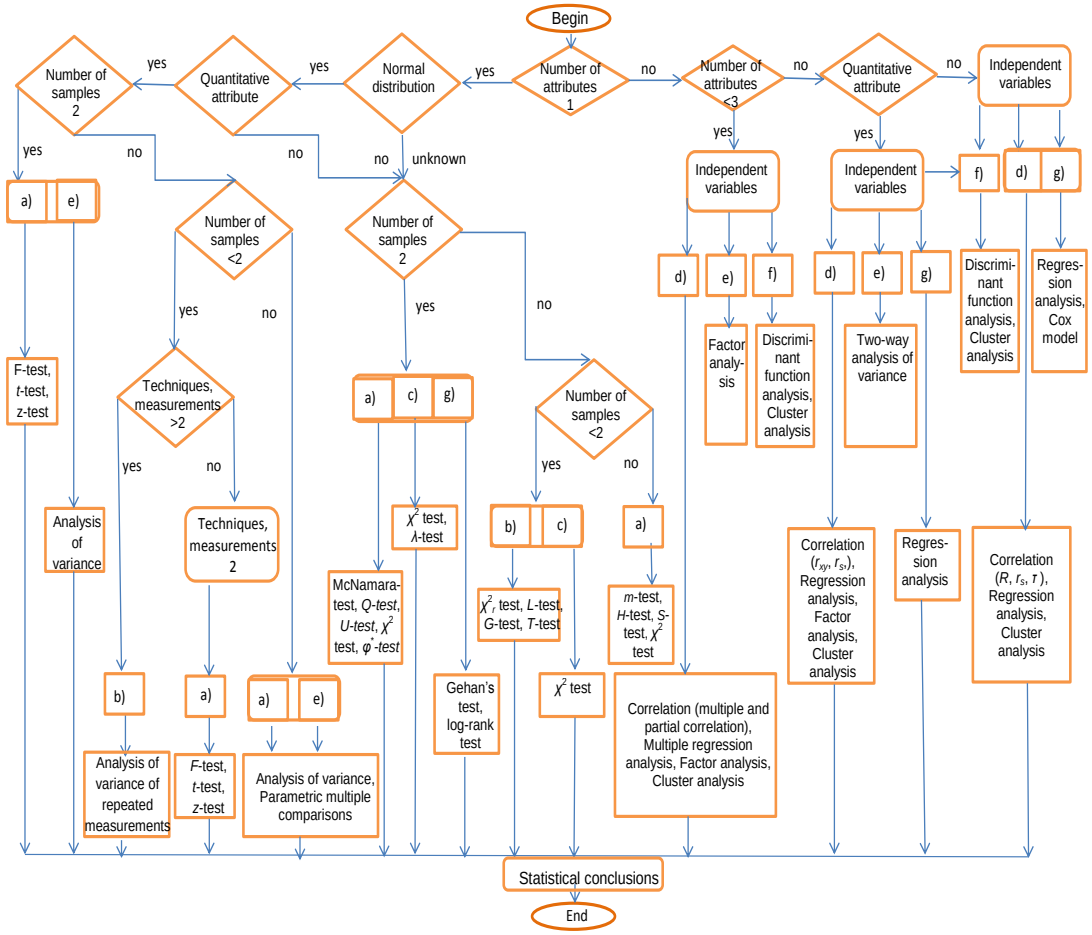


**Figure 1.** Algorithm of statistical method selection

In order to properly process the results of the experiment, the researcher should start one's study by setting a statistical task, while fully defining the conditions in which the research is carried out (number and capacity of the sample populations, their dependence or independence, and the normal distribution etc.), and then based on the above algorithm researcher should select the statistical criterion.

Statistical methods are used to measure, describe, analyze, interpret and model taking into account the limited amount of data to solve specific scientific tasks (Shilova 2014). The demand for statistical methods applications is dictated by the variability of the behavior and outcome of practically all processes, even under conditions of apparent stability.

Let us consider a specific example of the statistical methods application for solving practical problems. Below is the number of cases tried on by the judges of the arbitration court of the Kirov region of the 5th judicial assembly, January 2015.

**Table 2.** Number of cases tried on by the judges of the arbitration court of the Kirov region of the 5th judicial assembly, January 2015.

| № s/p | Judge's full name | Cases presided (January 2015) |
|---|---|---|
| 1 | Vylegzhanina S.V. | 49 |
| 2 | Beltyukova S.A. | 31 |
| 3 | Vykharev S.M. | 15 |
| 4 | Dvinskikh S.A. | 57 |
| 5 | Kuldyshev O.L. | 45 |

In Table 3, there are data on the average work experience of the courtroom secretaries at the Arbitration Court of the Kirov region of the 5th judicial assembly as on 31.12.2014.

**Table 3.** Average work experience of the court secretaries at the Arbitration Court of the Kirov region as on 31.12.2014

| № judicial assembly | Average work experience of the court secretaries, years | Number of secretaries |
|---|---|---|
| 1 | 3,1 | 7 |
| 2 | 2,3 | 8 |
| 3 | 5,0 | 9 |
| 4 | 6,5 | 6 |
| 5 | 8,2 | 4 |

Thus, we found out that the average work experience of the court secretaries at the Arbitration Court of the Kirov region as of 31.12.2014 amounted to 4.6 years.

We now test the hypothesis that the increased workload on the judges to hear cases resulted in the deterioration of their performance (increased number of judicial decisions cancellations). Basic data are summarized in Table 4.

**Table 4.** Data for the calculation of the correlation coefficient

| Indicators | Performance improved | Performance deteriorated | Total |
|---|---|---|---|
| Workload increased | 2 | 6 | 8 |
| Workload has not changed | 10 | 18 | 28 |
| Total | 12 | 24 | 36 |

To test the hypothesis, we choose a static problem – it is "g)" (identifying the coherence of statistical evidence of changes). Further, we follow the algorithm: distribution of statistical feature is inessential, there are two of them, they are of qualitative type, task "g)", and therefore, we apply corresponding coefficient of correlation (or association φ): $\varphi = \frac{2 \cdot 18 - 10 \cdot 6}{\sqrt{12 \cdot 24 \cdot 8 \cdot 28}} = -0{,}094$. We now estimate the significance of the obtained value of the coefficient. For this purpose we calculate the value of criterion $x_p^2 = n\Phi^2$, where $n$ is a number of measurements. $x^2 = n \cdot \varphi^2 = 36 \cdot (-0{,}094)^2 = 0{,}321$. For a significance level of 0.05 and the number of degrees of freedom 1. Then we find in the table $x_{table}^2(0{,}05;\ 1) = 3{,}841$, as $0{,}321 < 6{,}635$, then the value obtained will be considered insignificant (with the reliability of 95%), which means the increased workload on judges does not affect the results of the cases they reviewed.

It should be noted that the statistical methods of basic data processing are not responsible for data validity, reliability. They are just a tool which you can use to perform a more thorough and profound interpretation of the experimental data, the results of surveillances and surveys. The reliability of empirical data should be achieved through selection of methods appropriate for research tasks, taking into account measurement scales, preciseness and carefulness of measurement, accuracy of the calculations.

## DISCUSSIONS

The works of many scholars are dedicated to the issues of statistical methods (Glantz, 1998; Glass & Stanley, 1976; Gmurman, 2003; Grabar 1977; Granichina, 2012; Yermolaev 2006; Cochran 1976; Mikheyev, 1987; Novikov, 2004, 2005; Orlov, 2001; Plato, 2000; Polonsky, 1987; Urbach, 1975; Hollaender, 1983).

The works devoted to psychological investigations (Ermolaev, 2006 and others), provide a classification of psychological problems solved with the help of statistical

methods, and corresponding steps to be taken to statistically address these problems, but these studies do not tackle relevant for today problems of survival.

In the papers describing medical research (Glantz, 1998), great attention was paid to the issues of survival, but they have fragmented structure of the statistical methods selection, without reference to the types of statistical tasks. The problem of survival, which had previously been considered, mostly inherent to medical research, has now become urgent in sociology and economics. However, these areas are missing clearly defined systematization of statistical problems and appropriate algorithms to solve them.

It should be noted that the authors in their works generally associate the problem of consistency of the statistical method selection for performing the experiment with the type of research.

In its turn, there are still many open questions, for example, there is a problem of selecting the most efficient statistical method, which mainly involves defining the characteristics of each method, a list of requirements to information and statistics.

In this regard, it is vital not only to master the knowledge of statistical methods but to acquire skills of its relevant application in various scientific studies. In our work we give a common (universal) approach to the selection of statistical methods.

## CONCLUSION

The above mentioned algorithm allows to incrementally choose the appropriate type of statistical task which is to be solved along with conducting the research. Then, on the basis of the choice made there should be defined the conditions of applying certain research methods.

With data obtained and statistical challenges of the study identified a final decision on the selection of statistical methods is made in accordance with the algorithm of applying statistical methods to specific scientific fields, and enabling to quickly and correctly choose appropriate method of statistical data processing. The algorithm suggested in this paper combines the advantages of a separate, previously known algorithms and techniques for selecting statistical methods to address the specific statistical tasks.

Thus, the methods of the research results processing and guidelines for their implementation have their own specific features, which, above all, are defined by a specific kind of research, its methodology and ways of research results presentation. Meanwhile, statistical methods can adequately use the available data for decision-making and thus contribute to positive change of some processes (psychological, sociological, economic, etc.)

## RECOMMENDATIONS

The paper is focused on studying various types of statistical methods of experimental data processing and understanding its application opportunities. Methods of research results processing and guidelines for their implementation for every scientific field related to the experiment have their own specific features, which are predetermined by a certain type of research, its methodology and ways of its results presentation. Although the experiment description for different research areas is rather specific, formal differences hide general methodology and common principles of building results processing systems.

It should be emphasized that the submitted work will help to purposefully and effectively apply the knowledge accumulated by the educators, teachers, and all those whose professional and scientific activities are related to the processing of experimental data. The paper is also intended for undergraduates, graduate

students, postgraduates representing all areas of training and may be of a great help for them in the development of professional competence.

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