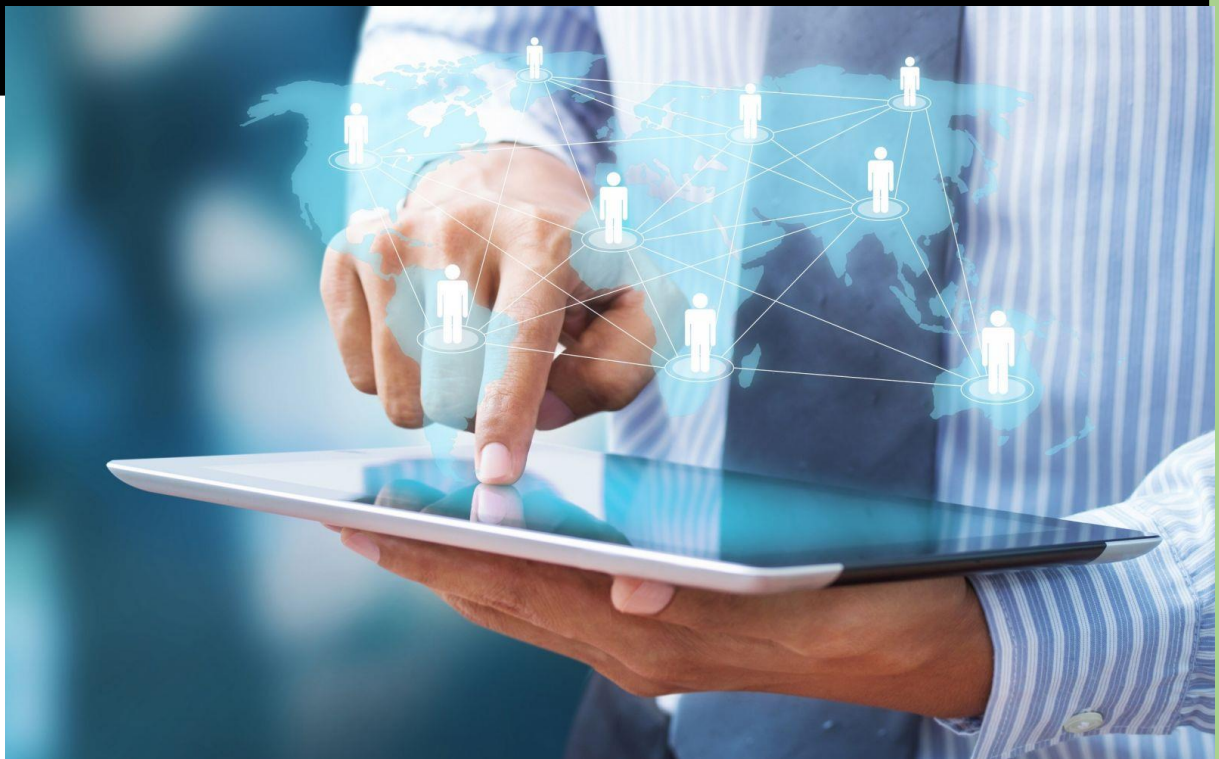


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Applied Financial Mathematics

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Zenkov A.V. A New Statistical Method of Text Attribution

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Abstract: A new method of statistical analysis of texts is suggested. The frequency distribution of the first significant digits in numerals of connected authorial Russian-language texts is considered. Benford's law is found to hold approximately for these frequencies with a marked predominance of the digit 1. Deviations from Benford's law are statistically significant author peculiarities that allow, under certain conditions, to consider the problem of authorship and distinguish between texts by different authors. At the end of $\{1, 2, \dots, 8, 9\}$ row, the digits distribution is subject to strong fluctuations and thus unrepresentative for our purpose. The approach suggested and the conclusions are backed by the examples of the computer analysis of works by M. Ageyev, V. Nabokov, M. Sholokhov, N. Nekrasov et al. The results are confirmed on the basis of non-parametric Mann-Whitney U test and hierarchical cluster analysis

Keywords: Benford's law, text attribution, text processing, Russian-language fiction, Mann-Whitney U test, hierarchical cluster analysis

INTRODUCTION

Recently, the scope of the practical use of Benford's law (Benford 1938) has significantly expanded. Known for over a hundred years, Benford's law refers to the probability of occurrence of a certain first significant digit in the distribution of various real life data. Contrary to the common assumption that the frequency of occurrence of *any* first significant digit should be equal, the digit 1 occurs more likely for many data sets! According to Benford's law, in the decimal system, probability of occurrence of the digit d as the first significant

$$P(d) = \lg\left(1 + \frac{1}{d}\right), \quad (1)$$

accordingly, the probability of should be , the probability of $d = 2 - 0.18$, etc.

An exhaustive explanation of Benford's law, covering all cases of its manifestation, has not yet been proposed, although some conditions favouring its

emergence are stated. A classic experiment by Benford, showing a good agreement with (1) – analysis of the occurrence of numerals contained in articles of a randomly selected issue of a magazine – is naturally explained by the theorem (Hill 1995), according to which, if one repeatedly randomly chooses a probability distribution and then randomly chooses a number according to that distribution, the resulting data set will obey Benford's law.

Incomplete understanding does not preclude the successful use of Benford's law to detecting fraud in accounting and auditing data (Nigrini 2012) and election fraud (Roukema 2014); the applications suggested extend from physics and astronomy (Biau 2015; Hill, Fox, 2016) through seismology (Sambridge et al. 2011) to steganography (Andriotis et al. 2013) and scientometrics (Alves et al. 2014).

Zenkov (2015) has shown the efficacy of counting frequencies of different first significant digits of numerals for text attribution. It was found that not only for the random combination of texts, but also for the *coherent* text to which the conditions of the afore-named theorem are not applicable, frequency distribution is close to Benford's law (1), but the quota of digit 1 considerably exceeds 30 per cent – at least since the word «one» formally being a numeral can actually play the role of an indefinite article. In contrast to the traditional methodology of application of Benford's law, which treats deviations from the law as an indication of the possible existence of «falsification» (broadly defined), he placed emphasis on the comparison of these deviations for texts by different authors, showing that these deviations are statistically robust author features that allow to distinguish between texts by different authors (under certain conditions, the most important of which is a sufficiently large text).

Basing on these ideas, we present here new research results concerning the distribution of the first significant digits of numerals found in coherent texts.

The study is experimental. The aim of the theoretical substantiation of the results (if such is possible) is not intended which, however, does not diminish the possibility of the practical use of the proposed methodology for practical problems of textual criticism.

For all (Russian-language) texts subjected to computer-aided statistical analysis, we have studied the frequency of occurrence of various first significant digits, taking into account the cardinal as well as ordinal numbers expressed both in figures, and (considerably more often) verbally. In the last case, the first step was to rewrite every form of a numeral with figures (e.g., ‘тысячи четырёхсот пятидесяти трёх’ replaced by ‘1453’) and then to take into account the first significant digit (1) only. To identify the author’s use of numerals, we previously deleted from the text all idiomatic expressions and set phrases accidentally containing numerals («семь пятниц на неделе», «в двух словах»).

Recognition of texts authorship

Authorship of the «Novel with Cocaine»

For sixty years, the Russian literary studies were facing the unresolved problem of authorship of the “Роман с кокаином” («Novel with Cocaine»), published in 1934 under the pseudonym «М. Ageyev». In the absence of reliable information about the author and any other relevant publications under this name the hypothesis has spread about the literary hoax. By virtue of a certain genre and stylistic proximity of the «Novel with Cocaine» to early novels by V. Nabokov, Ageyev’s novel was ascribed to him. Publication of previously unknown archival material in the 1990s (Sorokina, Superfin 1994) refuted this hypothesis. Although this particular philological question has already been solved, we will show the results of applying Benfordian methodology.

Below are the results of the statistical study of the «Novel with Cocaine» (Fig. 1), and Nabokov's Russian-language works (Fig. 2, 3 show the results for two novels as an example). Note a dramatic difference in the occurrence of significant digit 1 in Ageyev's novel, on the one hand, and in Nabokov's novels, on the other hand. In view of the length of the texts analyzed, this difference can hardly be explained by random fluctuations (unlike subsequent significant digits, which even in the books by the same author behave differently). It is a difference characteristic of the author's style. We tend to associate it with the psychological peculiarities that, regardless of the will and intention of the author, influence his texts. As for Ageyev, for the reason stated above, the material for comparison is missing, but all works of the first (Russian-language) period of Nabokov's artistic creation have a similar occurrence of unit as the first significant digit.

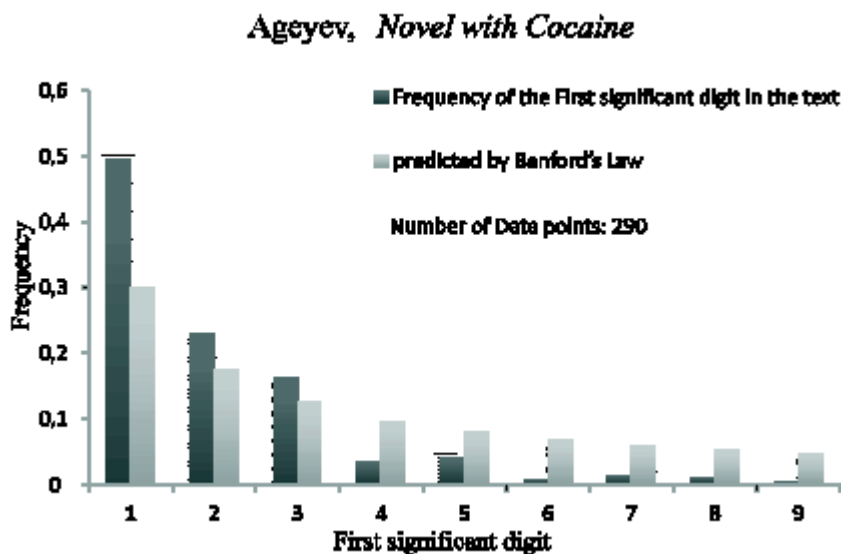


Fig. 1. The distribution of the first significant digits of numerals in Ageyev's *Novel with Cocaine* (1934). The results here and below are compared with those expected according to Benford's law

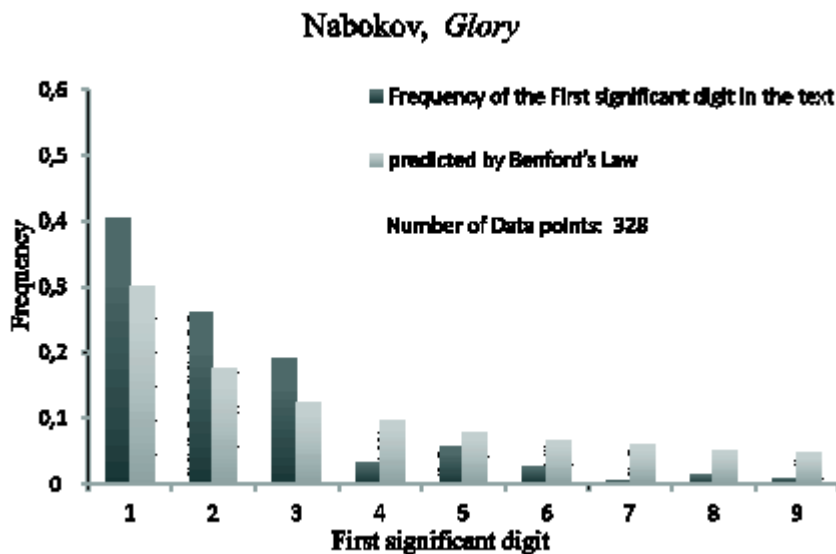


Fig. 2. The distribution of the first significant digits of numerals in Nabokov's «Подвиг» (*Glory*) (1931)



Fig. 3. The distribution of the first significant digits of numerals in Nabokov's «Дар» (*The Gift*) (1937)

Of course, the comparison of the distributions cannot be based merely on the detection of their subjective visual similarities and differences. We have applied the

non-parametric Mann-Whitney U test. The null hypothesis, which asserts the absence of significant differences in the distributions considered, was rejected and accepted exactly in the cases, as described above. The difference between Nabokov's novels turned out to be insignificant, whereas Ageyev's «Novel with Cocaine» significantly differs from each of them.

These conclusions are supported by a dendrogram, visualizing the results of the hierarchical cluster analysis. We have analyzed the frequency distributions of the first significant digits of numerals in texts in terms of the similarities/differences between these distributions. Hereinafter, for clustering, the method of average linkage between groups (Gan et al. 2007) (as a balanced approach, avoiding the extremes of the nearest and furthest neighbors methods) with the Chebyshev metric that determines the distance ρ between the n -dimensional numeric vectors \mathbf{x} and \mathbf{y} as the maximum of the

components difference modulus: $\rho(\mathbf{x}, \mathbf{y}) = \max_{1 \leq i \leq n} |x_i - y_i|$. Here, the vector components are frequencies of the first significant digits in each of the texts analyzed. Obviously, the maximum of the difference modulus can be achieved at the i value ($i=1, 2, \dots, 9$) for which the frequencies are originally not small, and this is usually significant digits 1, 2, and 3. However, it is the frequencies of these digits (especially, digit 1) which determine the text specificity in our methodology; that is why we chose the Chebyshev metric.

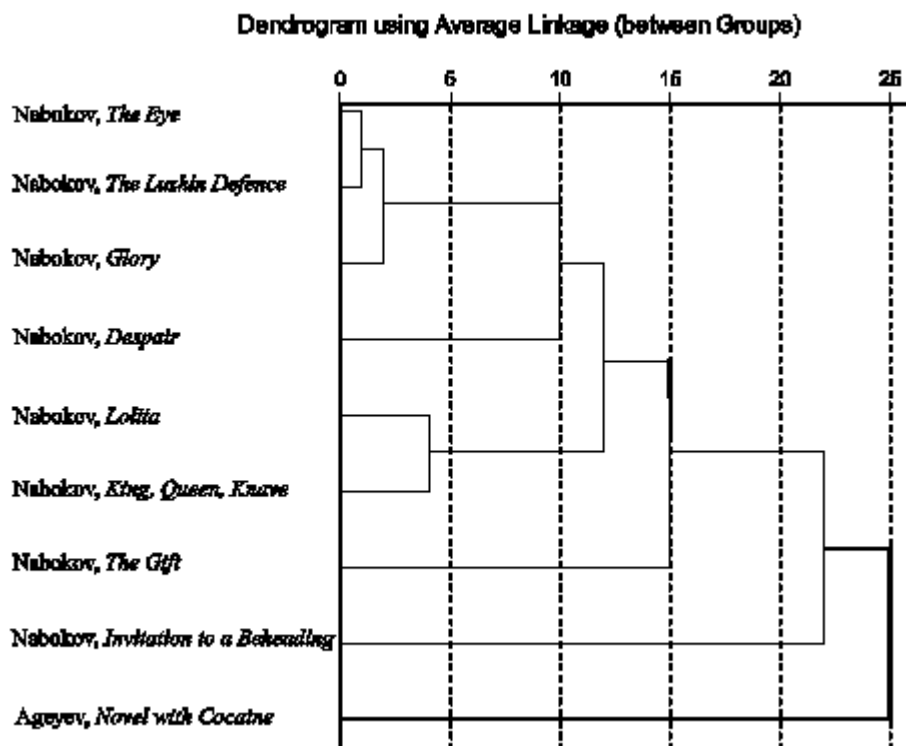


Fig. 4. Dendrogram of frequency distribution clustering for the first significant digits of numerals in the texts by Agseyev and Nabokov

We have performed the clustering for the «Novel with Cocaine» and almost all of Nabokov's novels, written in Russian or with the author's translation into Russian («Соглядатай», «Защита Лужина», «Подвиг», «Отчаянье», «Лолита», «Король, дама, валет», «Дар», «Приглашение на казнь») (Fig. 4). The distance ρ is measured on the horizontal scale; the bigger it is, the less similar the analyzed objects (texts) are. Agseyev's novel stands out among all the processed texts, joining them at the final stage of clustering.

Thus, the statistical method based on the calculation of the first significant digits of numerals, is able to answer the question about the text authorship.

The problem of «Quiet Flows the Don»

Another well-known problem of texts attribution is the question of authorship of the novel «And Quiet Flows the Don» («Тихий Дон») and, more broadly, the entire literary heritage of M. Sholokhov. There are strong arguments in favor of the plagiarism version, and some arguments against it. The novel consists of eight parts, combined into four books. Linguistic and statistical study of the novel has led many researchers to the conclusion that the text is extremely heterogeneous. The first parts (or at least their Urtext used by Sholokhov) are attributed by many experts to the writer F. Kryukov, although there is another candidate – V. Krasnushkin, and in the text of subsequent parts one discerns the style of A. Serafimovich, B. Pilnyak, A. Fadeev (non-exhaustive list). The opinion has been expressed, that not only the authorship of «Quiet Flows the Don» is doubtful; that also «Virgin Soil Uplifted» («Поднятая целина») and «They Fought for their Country» («Они сражались за Родину») are written not by Sholokhov, but by others (in particular, A. Platonov was named) (Kuznetsov 2003).

Without going into detail in the review of the problem, we present our results of the exploration in the framework of Benford's methodology.

First, we performed a statistical analysis of three novels by Sholokhov (Fig. 5). The distribution of first significant digits of numerals is very different in them, despite the fact that this distribution is usually characteristic of the author.

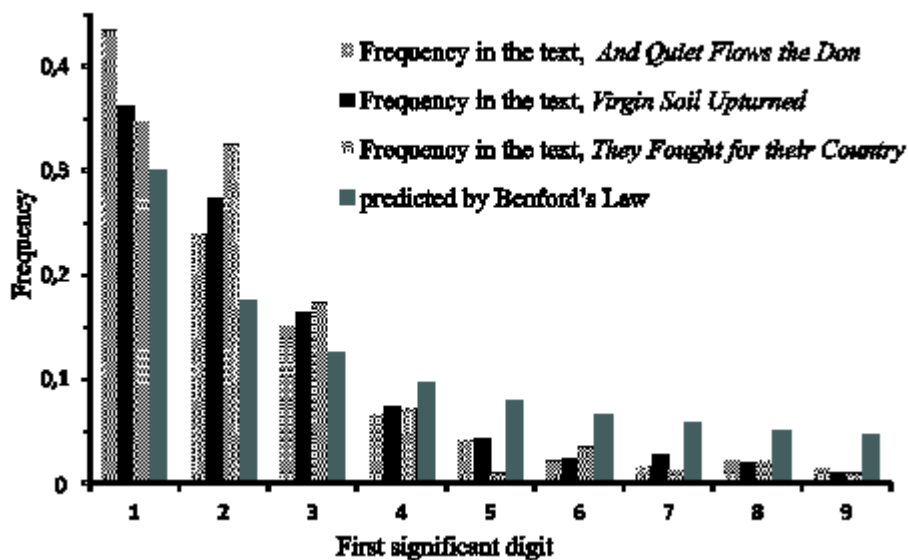


Fig. 5. The distribution of first significant digits of numerals in Sholokhov's novels «And Quiet Flows the Don», «Virgin Soil Uplturned», «They Fought for their Country»

This result made necessary a more detailed comparative analysis of the major works attributed to Sholokhov, as well as texts of some authors, who are considered the true creators of these works: Platonov, “Chevengur” («Чевенгур»), “The Foundation Pit” («Котлован»), “The Innermost man” («Сокровенный человек»); Pilnyak, “The Volga Falls into the Caspian Sea” («Волга впадает в Каспийское море»); Krasnushkin, “The Don with Crutches” («Дон на костылях»); Serafimovich, “The Iron Flood” («Железный поток»); Fadeyev, “The Rout” («Разгром»), “The Young Guard” («Молодая гвардия»). Besides three main novels by Sholokhov, we also analyzed the whole text of his early “Tales of the Don” («Донские рассказы»). The dendrogram of clustering the distributions of first significant digits of numerals is shown in Fig. 6. Some conclusions (confirmed by Mann-Whitney U test):

1) Different parts of «Quiet Flows the Don» and «Virgin Soil Upturned» are distributed across different clusters, which indicates the internal statistical heterogeneity of texts in terms of the distribution of first significant digits of numerals (cf. statistically close «The Rout» and «The Young Guard» by Fadeyev);

2) The assumption that Platonov, Pilnyak, and Serafimovich *could* participate in the creation of the text of «Quiet Flows the Don» and the first book of «Virgin Soil Upturned», is not ungrounded;

3) Authorship of Krasnushkin in regard to the «Quiet Flows the Don» is more doubtful;

4) «They Fought for their Country» and the second book of «Virgin Soil Upturned», chronologically created in the same era may pertain to the same author;

5) Kryukov's texts are statistically close to the initial parts of the «Quiet Flows the Don».

6) It is highly doubtful that «Tales of the Don», on the one hand, and «The Quiet Don», «Virgin Soil Upturned», «They Fought for their Country» belong to the same author.

These findings are in good agreement with the results briefly described above which were obtained by other (mainly, philological) methods.

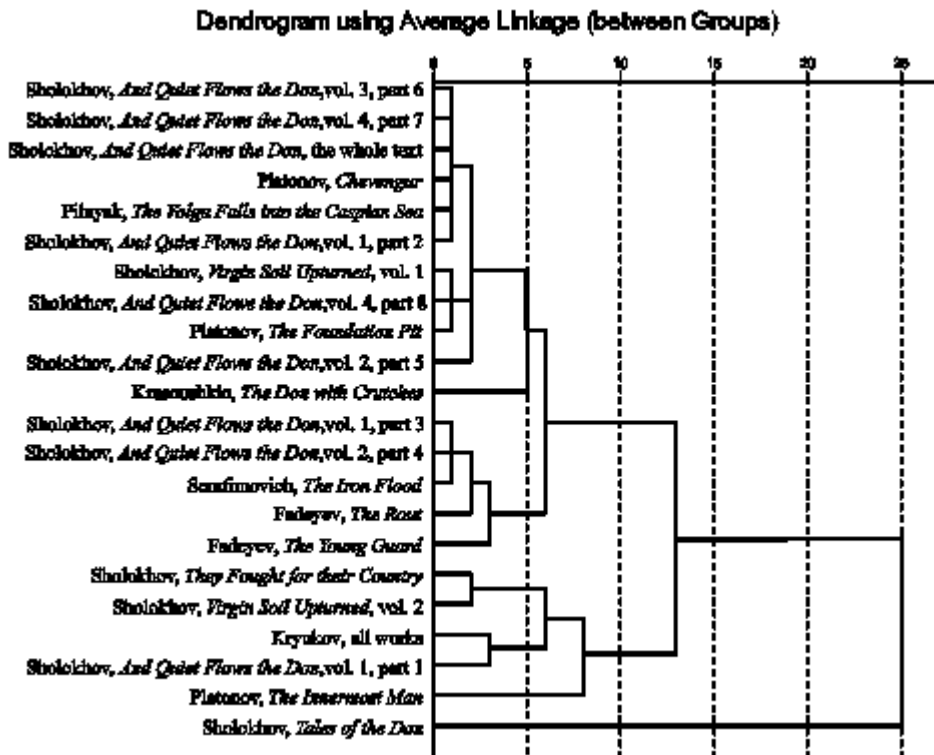


Fig. 6. Dendrogram of frequency distribution clustering for the first significant digits of numerals in the texts by Sholokhov and the presumable authors of books attributed to him

Note that (all available for analysis) Kryukov's texts are relatively small in size, so we had to merge them into one file for statistical analysis. The same applies to Sholokhov's «Tales of the Don». Available for analysis was only one text by Krasnushkin. Platonov's «The Innermost Man» is relatively small, which could affect the statistical significance of the results for this novel.

Thus, Benfordian analysis can be useful in the study of text's authorship.

Testing of methodology: Nekrasov's early prose

An interesting opportunity of testing the idea about the relation of text authorship to its statistical characteristics is provided by the novels «Three Parts of the World»

(«Три страны света») and «The Dead Lake» («Мертвое озеро») written by N. Nekrasov, much better known as a poet, at the beginning of his literary career, together with A. Panayeva and first published in 1848–1849 and 1851, respectively.

The manuscripts of novels have not been preserved, so the question of the division of labor between the co-authors should take into account their own testimonies. In Panayeva's «Memoirs» («Воспоминания»), writing «Three Parts of the World» is ascribed to the two – both Nekrasov and her; as for «The Dead Lake», the participation of Nekrasov was limited to the elaboration of the plot and writing a small part of the text. Guided by philological considerations, literary scholars – contrary to Panayeva's testimony – discern in *both* novels a substantial part of the text, written by Nekrasov (with indication of specific chapters) (Nekrasov 1965; Nekrasov 1985).

We have counted the frequencies of various first significant digits of numerals in parts of each novels attributed by literary scholars to a specific author (Nekrasov, Panayeva), and, for comparison, performed the same analysis for Panayeva's «Memoirs», as well as for the early prose works by Nekrasov as the sole author (Fig. 7).

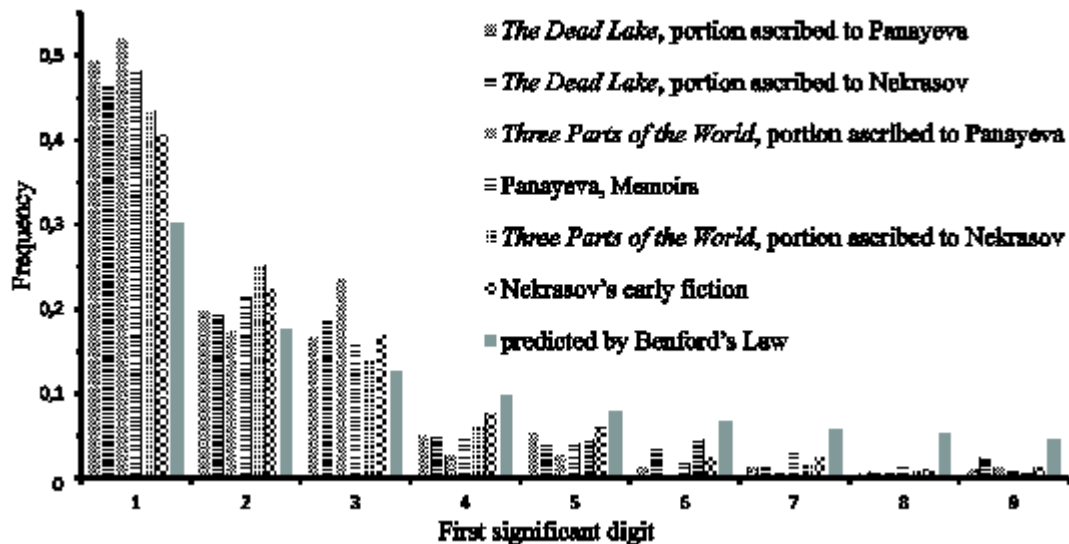


Fig. 7. The distribution of first significant digits of numerals in the texts by Nekrasov and Panayeva

Some conclusions:

1) The distributions of first significant digits of numerals in parts of “The Dead Lake» attributed to Nekrasov and Panayeva are generally similar and comparable with the results for the part of «Three Parts of the World», attributed to Panayeva (except for numbers 3, in which the graph shows outlier). For Panayeva’s «Memoirs», similar results have been obtained.

2) The distribution of first significant digits of the numerals in chapters of «Three Parts of the World», attributed to Nekrasov, significantly differs from the three above mentioned distributions, but is similar to that for Nekrasov’s early fiction. Panayeva’s participation in writing this part of the novel, too, is not excluded.

3) From this, it follows that different parts of “The Dead Lake» are probably written by the same author, namely – Panayeva, but different parts of «Three Parts of the world», indeed, have a different authorship.

4) So, there is no reason not to trust Panayeva in her testimony about the process of writing her two joint novels with Nekrasov.

The text indicated in the figure 7 as Nekrasov’s early fiction incorporates «The Story of a poor Klim» («Повесть о бедном Климе»), «The Life and Adventures of Tikhon Trostnikov» («Жизнь и похождения Тихона Тростникова»), «Surguchov» («Сургучов»), «The Thin Man, his Adventures and Observations» («Тонкий человек, его приключения и наблюдения»), «On the same Day at eleven o’clock...» («В тот же день часов в одиннадцать утра...») (Nekrasov 1984).

We believe that our methodology can be a useful addition to traditional textual practices, taking into account sentence length, word length, occurrence of certain words and parts of speech, etc. (Mitkov 2003; Aronoff, Rees-Miller 2004).

CONCLUSION

1) Benford’s law holds approximately for coherent texts.

2) Deviations from Benford’s law are statistically significant author features that allow, under certain conditions (the most important of which is a sufficient length), to distinguish between the texts with a different authorship.

3) The actual frequency of occurrence is higher than the probability according to Benford’s law for significant digits 1, 2, 3; for the subsequent digits the situation is reversed. At the end of {1, 2,..., 8, 9} row, the digits distribution is characterized by strong fluctuations and thus is unrepresentative for our purpose.

References

1. Alves AD., Yanasse HH, Soma NY, 2014. Benford’s Law and articles of scientific journals: comparison of JCR and Scopus data. *Scientometrics* 98:173–184.

2. Andriotis P, Oikonomou G, Tryfonas T, 2013. JPEG steganography detection with Benford's Law. *Digital Investigation* 9: 246–257.
3. Aronoff M., Rees-Miller J, eds., 2004. *The Handbook of Linguistics*. Oxford: Blackwell Publishing.
4. Benford F, 1938. The law of anomalous numbers. *Proceedings of American Philosophical Society* 78: 551–572.
5. Berger A, Hill TP, 2015. *An Introduction to Benford's Law*. Princeton: Princeton University Press.
6. Biau D, 2015. The first-digit frequencies in data of turbulent flows. *Physica A* 440: 147–154.
7. Gan G, Ma C, Wu J, 2007. *Data Clustering: Theory, Algorithms, and Applications*. Philadelphia: SIAM.
8. Hill TP, 1995. A Statistical Derivation of the Significant-Digit Law. *Statistical Science* 10: 354–363.
9. Hill TP, Fox RF, 2016. Hubble's Law Implies Benford's Law for Distances to Galaxies. *Journal of Astrophysics and Astronomy* 37, no. 4: 8 pages.
10. Kuznetsov FF, ed., 2003. *New on Mikhail Sholokhov. Research and Materials*. Moscow: Institute of World Literature (Новое о Михаиле Шолохове: Исследования и материалы / Ф. Ф. Кузнецов и др. (ред.). М.: ИМЛИ РАН, 2003).
11. Mitkov R, ed., 2003. *The Oxford Handbook of Computational Linguistics*. Oxford: Oxford University Press.
12. Nekrasov NA, 1965. *Three Parts of the World*. Yaroslavl: Upper Volga Book Publishers (Некрасов Н.А. Три страны света. Ярославль: Верхне-Волжское книжное издательство, 1965).

13. Nekrasov NA, 1984. Narrative prose. Unfinished novels and stories 1841–1856. Leningrad: Nauka (Некрасов Н. А. Художественная проза. Незаконченные романы и повести 1841–1856 гг. Полн. собр. соч. и писем в 15 томах, Т. 8. Л.: Наука, 1984).
14. Nekrasov NA, 1985. The Dead Lake. Leningrad: Nauka (Некрасов Н. А. Мертвое озеро. Полн. собр. соч. и писем в 15 томах, Т. 10, кн. I, Л.: Наука, 1985).
15. Nigrini MJ, 2012. Benford's Law: applications for forensic accounting, auditing, and fraud detection. Hoboken: John Wiley & Sons.
16. Roukema BF, 2014. A first-digit anomaly in the 2009 Iranian presidential election. Journal of Applied Statistics 41: 164-199.
17. Sambridge M, Tkalčić H, Arroucau P, 2011. Benford's Law of First Digits: from Mathematical Curiosity to Change Detector. Asia Pacific Mathematics Newsletter. 1, no. 4: 1–6.
18. Sorokina My, Superfin GG, 1994. 'There was a writer Ageyev' ...: a version of the fate or about the benefits of naive biographism. In: The past: Historical almanac, vol. 16. Moscow, St. Petersburg: Phoenix-Athenaeum, pp 265–289 (Сорокина М. Ю., Суперфин Г. Г. «Был такой писатель Агеев...»: версия судьбы или о пользе наивного биографизма // Минувшее: Исторический альманах. Вып. 16. М., СПб.: Феникс-Атенеум, 1994. С. 265–289).
19. Zenkov AV, 2015. Deviation from Benford's law and identification of author peculiarities in texts. Computer Research and Modeling 7: 197–201 (Зенков А. В. Отклонения от закона Бенфорда и распознавание авторских особенностей в текстах // Компьютерные исследования и моделирование. – 2015. – Т. 7, вып. 1. – С. 197–201).

Econometrics

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Borodai V.A. Simulation assessment center in the service of the company as a factor in the accuracy and validity of the information about the employee

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Abstract: The article reveals the relevance of evaluation method for personnel assessment center technologies. The efficiency of the method in terms of accuracy and validity of the assessment of employees. Identified positive factors and problematic use of assessment center technology service company

Keywords: assessment center, validity, competence, motivation policy, creativity, evaluation procedures

1. Introduction.

Current rating personnel at this stage due to the fact that the main resource of any service company that enables people to successfully compete in the market are. Unfortunately, in certain periods of activity of company service personnel loyalty falls, and business needs funds competent management of people, including the correct and valid assessment and planning of training and development of employees as a result of the evaluation. In recent years, it is becoming increasingly important for the assessment of staff assessment center technologies. But before you take up the implementation of this system, it is necessary to understand carefully the location of all the pitfalls. After carrying out assessment center, with all its advantages — it is extremely difficult and time-consuming procedure. Evaluation of employees — one of the essential tasks in the personnel management system of the service company. Assess the need for many purposes:

- for admission of candidates for vacancies;
- for effective adaptation accepted candidates, training and career planning;
- to make informed management decisions on the promotion of employees working in the company, they are setting in staff and management allowance, appointment to a higher position;
- to motivate employees to self-education and self-development;
- to improve staff loyalty and motivation to develop effective policy service company.

2. Materials and methods.

Validity staff assessment depends on several factors. Firstly, a service company clear evaluation criteria must be developed. As such criteria are the lists of corporate, managerial and professional competencies, which must conform to certain categories of employees. As a general rule, competence prescribed by the content and behavioral indicators, as well as specific scales for each position and the built appropriate competency model [1]. The assessment revealed which of the necessary competencies for specific employee development at a high level, and which require further development. In this case, we selected two directions in the development of employees.

The first direction — is a further development of «strong» competencies of successful professionals in the service of the company.

The second direction — or the development of those competencies that are at an insufficient level of development and does not meet the requirements of the service company. Of course, the integrated approach when the further development of «strong» competences of key employees, and «pulled» their weaknesses can be selected. For example, creatives «strong» competence, as a rule, appears the ability to formulate new, innovative solutions in a complex, troubled business situation. However, they are often

not sufficiently disciplined, late, delay the timing of the assignment. For further development of creativity can be scheduled trainings vision (strategic development of the company in a competitive market), and for «pulling» office discipline planned training on time management and self-management.

It should be clearly understood: the evaluation criteria (lists of staff competencies) if the service companies are not designed to introduce a system of valuation methods, the more simulation exercises and games business valuation should not be. If done in the service of modeling work and output scale of competencies, we can assume that solved a major challenge, but it is still half the work on personnel evaluation.

The second part of the work — a selection of valid methods for assessing employees. According to most experts, assessment methods, assessment center components should not be limited to individual and group simulation games and exercises that reproduce the work tasks specific job or position. Effective assessment center consists of a system evaluation methods, and, for each selected competence several evaluation methods, usually from two to four [2]. In addition to the simulation games and exercises necessary to use such methods of assessment, as the analysis of personnel documents, which give information on quality valid values, managerial and professional competencies of the candidate or employee. This, above all, a summary, which briefly provides information on the educational status of the employee, his main achievements and dynamic career.

It is also necessary to conduct an interview with an expert in order to clarify their interests, goals, financial and career expectations, which it plans to implement in their professional activities. You may also want to get an expert evaluation, if the candidate will interview successful company employee with the appropriate specialization. If the

assessment takes service employee for the setting of management reserve, obligatory acts vertical expertise, ie, expert assessment of his immediate supervisor.

And finally, the evaluation will be useful in using business-oriented psychological tests, especially in the assessment of those competencies that can not occur in the external behavior of a candidate or an employee in terms of simulation games and exercises [3]. For example, a game of valuation techniques using only difficult, and sometimes impossible, to assess the motivational profile of the candidate, his intellectual capacity, reserve growth and development of the border.

It is clear that a purely gaming techniques and exercises should not act as the sole and sufficient in the evaluation of the candidate or employee of the company, it is necessary to use a pool of different assessment methods now known in the recruitment market. Moreover, it is desirable to use as much as possible evaluation methods, because if the identified level of competence development is confirmed by various methods, you can be sure that it really is one of the common assessment. «There are no trifles, there are details in the human evaluation,» [4]. Indeed, only in the evaluation of the system by methods possible to achieve such a complex assessment of the accuracy of «structure», what is a person, personality, individuality.

We consider two cases: when the estimate of the candidate coming into the service company on the available free area, and when the estimate of the employee for raising the reserve for the position, which is available in the near future.

If the assessment is subject to a candidate, it is usually first seen his resume and documents that he or recruitment agency sent to the company. Then the candidate is invited for an initial interview, which is conducted rapid diagnosis and interviews, as well as peer review, professional and psychological testing. Data evaluation methods all can be limited, as a service company already has sufficient evaluative information to

make a decision on choosing the most suitable candidates for vacancies. Game evaluation procedures for candidates performed in three cases.

First, if the company «can afford it», ie, it is very well known on the market, candidates dream to get it in this company, and office staff conducts a full assessment center on their

Second, if a key area claimed by three or more candidates, and service company needs a very accurate assessment of their competencies as an error in the assessment could cost the company dearly, and very expensive.

Third, if a large number of candidates apply for several vacancies. Example for the third case: in the service of the company for five free positions «sales manager» claimed twenty or more candidates with sales experience. In this case, conduct interviews with each candidate, which usually lasts up to six hours in the case of twenty candidates, due to the high cost of working time employee personnel services. If we take the time to interview up to 5 hours a day, because there are still ongoing HR-tasks, it is six working days would hardly leave the meeting room (about 30 hours). In this case, game exercises conducted with the entire group of candidates, for example, the assessment of such competence as «the skill of working with objections», which will take a couple of hours, will quickly make a first filtering and leave 3-5 people in the group of candidates twenty for subsequent interviews [5].

After the play session candidates go home, and the head of the center of the assessment and development of a group of observers to conduct an integrated session — discussion of evaluation results for each candidate. The next step — is communication with the candidates of the evaluation. Those candidates who have successfully passed the assessment, invited the company to undergo a probationary period.

In the second case, when the estimate of employees working in the company, for setting the reserve position in the top management, which is available through a year or two, the assessment is as follows. Service personnel seek the opinion of the heads of the relevant departments and documents from the personnel department, and also analyzes its own personnel documents when the company holds regular appraisal, questionnaires, interviews, psychological testing and professional staff.

As a result, reservists prepared group, each of which being interviewed for the purposes of determining assessment center, as well as the motivation of employees to undergo such an assessment. If people are not yet accustomed to the passage of the evaluation procedure, you must submit it to the need on the part of the benefits in the first place for them, and only after that — for business. Thus, the list of benefits for employees introduction assessment center can be:

- if they offer undergo an evaluation procedure for the post top manager, therefore, the company recognizes their high contribution to the business;
- from the evaluation they get new career opportunities;
- the evaluation they can compare their own success with the level of success of other strong managers in the service company;
- in the result of the evaluation will be planned training on the further development of «strong» qualities and «pulling» of competencies that make up the zone of proximal development [6].

In parallel with these tasks, you must choose a provider in the market that specializes in assessment center, to hold talks with him, to determine the timing and cost of the work. If an assessment is necessary to carry out quickly and accurately, and the office staff never done it, it is better to turn to the consulting company, and not to carry out their own assessment. In this case, in the contract can include a clause stating that

the staff officers will participate in assessments as observers, and to the passage of the entire evaluation procedure the provider is obliged to transfer the company's test methods, games and exercises that are tailored to the specifics of the business of the customer. In the subsequent time, after the training of service personnel assessment center technology consulting company can take over the function of accompanying counseling that can cost for the client company less than once every year or two, invite provider.

If the service company have the time, and the service staff has decided to carry out assessment center on its own, apart from modeling competencies need to be resolved the problem of the structure and organization of the center of the assessment and development, the development and approval of the Regulations on the Center for the development and evaluation, development and adaptation of test methods and game exercises, select the moderator, the development of protocols for observers, observer training. Certain tasks are budgeting and planning assessment center. It should be emphasized that the gaming segment assessment center is significantly costly for a service company.

3. Results and Discussion

What are the resulting advantages and disadvantages (difficulties) of the method? May be mentioned as the benefits of a complete assessment center are:

- search for the best professionals in the foreign market and within the company;
- the image of a service company in the external market and internal communications as a modern, «advanced» company that cares about the objectivity and transparency of staff assessment;

- high validity of the system of assessment methods, including the assessment of the game;
- reduction of time for external evaluation candidates (in a simultaneous evaluation group, as compared with an individual interview);
- an optimal alignment of the candidates in the service company when evaluating candidates for the reserve, their training and the decision on the replacement of key positions;
- the union of three HR-tasks for internal and external candidates — assessment, training and career development;

Difficulties in the application of the full assessment center technologies are as follows:

- calls for the development of competence models in the service company;
- it requires high professionalism of management and staff personnel services directly;
- high costs of time and financial resources;
- a mandatory internal PR service in the company, if this evaluation procedure is introduced on a regular basis;
- mandatory feedback from internal and external candidates;
- stress and demotivation of the candidate in the case of a wrong choice of exercises and disagreement with the assessment of employees;

How relevant is this method in Russian business? Before the crisis, interest in the assessment center was high enough, he fell into a crisis, and now, after the crisis, business interest in the appraisal procedure increases again. This is, of course, so many companies there was tension between management and employees. The crisis unpopular decisions to optimize personnel costs have been taken, many experts have been

dismissed. For those who remain in the company, «collapsed» additional tasks, as a result they now feel underpaid and bleached, overwork.

The loyalty of the staff falls, and business needs funds competent management of people, including the right, one of the common assessment and planning of training and development of employees as a result of the evaluation [7].

However, how active it is necessary to use the full «package» of valuation techniques, including the assessment of the costly game? After all, the company has other methods of assessment, less time-consuming and financial resources: assessment of an employee as a result of his work, in a balanced and key performance indicators, the assessment in the appraisal, assessment officer of his head (vertical expert evaluation), evaluation of the employee by his mentor (horizontal expert evaluation), evaluation of employee 360-degrees (with the assessment on the part of clients and colleagues). In this case, a service company employee has an accurate and valid information, almost equal to the accuracy and validity of the total, including the gaming component, assessment center.

It should also be noted that in Russia began to use other formats assessment center, less time consuming and financial resources:

- Personal assessment center (when carried out an individual assessment of the candidate for the position of top-manager);

- Included assessment center (when employees are assessed in the course of corporate training, team building or corporate event by the personnel officers).

It should be recognized that not all foreign companies use high-grade, expensive gaming assessment center. Thus, the frequency of the use of assessment centers in the US and the UK about this: in large companies with a staff of over 500 people. — Up to 70% in small companies, employing less than 50 people. — Up to 25%.

Thus, on the one hand, it becomes dangerous fanatically faithful varying Western technology, because instead of a positive outcome, can demotivate key personnel and ultimately, reduce their loss of effectiveness of up to loyalty and care of the service company. On the other hand, if the service company — a large, having the means to implement the new evaluation procedures, and serious training at their own expense, assessment center can be recommended to her.

References

1. Borodai VA Increased business potential based on Business Intelligence technologies // Technology Business in Russia: Theory and practice, IV Int.. scientific-practical. Conf., 2016. Saratov: Publishing House MTC "Business Academy", 2016. – 46p.
2. Zhuravlev PV, Kulapov MN, Sukharev SA International experience in personnel management. Review of foreign sources / monograph. - Moscow: Publishing House of Ross. ehkon. Academy, Ekaterinburg: Business Book 2013.
3. Borodai VA Evolution of the service management system in the XXI century: the congruence of artificial intelligence and creativity // Science Today: postulates of the past and the modern theory: V int. Scientific-Practical Conf. 2016 Saratov: Publishing House MTC "Business Academy", 2016. - S. 3-7.
4. Iacocca, L., Whitney K. Where are all the leaders? per. from English. SE Borich - Minsk: "Potpourri", 2008.
5. Borodai VA, Kazmina LN The process of commercialization of individual competencies in tourism on the basis of a personal brand // Economy and Society. - 2015. № 6-1 (19). Pp 378-381.

6. Eremenko IA, MN Bezuglova, Ganzina AD Modern trends in international tourism and the place of Russia in the global tourism market // The young scientist. - 2016. - №2. - S. 490-493.

7. Borodai VA Socio-societal analysis of institutional sphere of trade in today's society: thesis for the degree of Doctor of Social Sciences. Novocherkassk 2009

UDC 316.4; 338.2

Zakharova S.G. Factorial approach to population life quality management

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Abstract: The article defines the term of population life quality. The main components characterizing the life quality of population have been revealed. The factorial approach to population income level increase has been represented graphically. The factors that impact on the life quality of population by the management system have been reviewed. The author has represented graphically the administrative impact by the municipal authorities on the life quality of population, which relates to creation of the conditions for economical, medico-ecological and culture-spiritual development of the municipal district. The interview with the respondents about the percentage distribution of the components constituting the life quality of population has been analyzed by comparing both predicted and actual values. The possible reasons for difference between the predicted and actual values of the components constituting the life quality of population have been found. The opportunities of the author-suggested factorial model of population life quality management for development of territories have been assessed.

Keywords: life quality, municipal districts, the factor model of population life quality management, estimation of the population life quality components

The institutional transformations of contemporary Russia are primarily aimed to principally change the life quality of population [3]. The population life quality management process provides the managing impact on the state and municipal socio-economical interrelations; however, it is not a simple task to assess the efficiency of such impact. Due to the fact that GOST ISO 9001-2011 defines the term “quality” itself as the degree of compliance of the total of inherent characteristics with the certain consumer requirements, the life quality of population will be understood as the degree of compliance of the total of inherent life-activity characteristics with the certain population requirements. The evaluation of “population life quality” by the scientists of different scientific schools [6] assumes the evaluation of the hierarchic system of the factors, criteria, and indicators that characterize comprehensively the economic

development of society, material welfare level, medico-ecological and culture-spiritual well-being of population.

The institutional reforms discover the new capabilities to increase the population well-being level by means of the extra income sources [1]. From the factorial approach, the population revenues allow for not only labor payment but also returns on investment in the form of dividends, interests, property income, and the broad capabilities to use entrepreneurial skills [2]. According the Government of Russia, the revenues from sales of the production factors that are in ownership and economical processes shall significantly increase the quality of population life. In addition, the factorial model of population life quality management proposed by the author (Fig.1) [4] allows showing pictorially not only the capabilities to increase the population well-being level but also the managing system's role in population life activity. The managing impact by the state and municipal authorities is to create a developed infrastructure, comfortable institutional environment, and special investment climate that ensure the conditions to implement easily the production factors in the economic territory [5]. Aimed to increase the quality of population life, the socio-economic system being interrelated functionally inside enables to determine the new horizons of economical, medico-ecological, and culture-spiritual development of the territory.

The factorial model of population life quality management under consideration shows the availability of three input factors which impact cannot be assessed by direct quantitative indicators but they are able to significantly change the life quality of population.

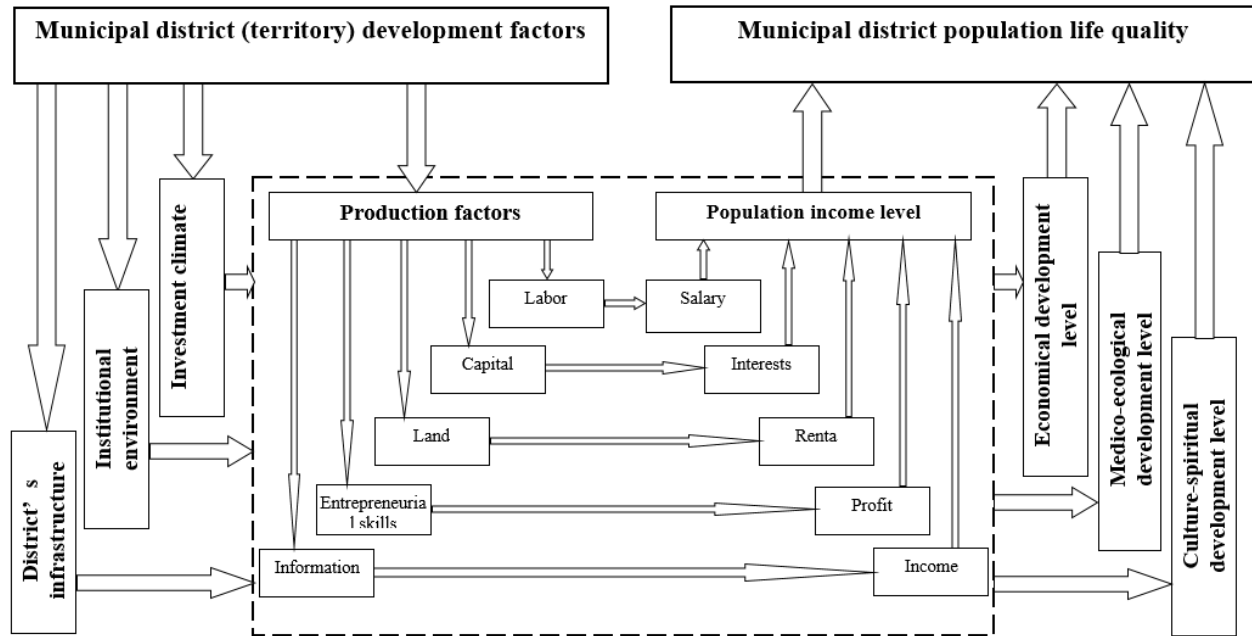


Figure 1 Factor model of population life quality management [4]

For the proposed factor model of population life quality management, the comprehensive population life quality study was conducted at the rural and municipal districts of the Nizhni Novgorod Region from 2010 to 2014, where more than 1500 persons with higher and incomplete higher education took part. The respondents were proposed to assess on a scale from one to ten their life quality components that include the general economic development, population income, spiritual well-being, and medico-ecological welfare levels. The respondents indicated their own satisfaction levels in each individual life-activity area as the degree of compliance of their requirements for the total of inherent characteristics with their life quality components. For the study, the respondents were suggested to make a prediction for 2015-2016. A portion of the study results was in the earlier works of the author [7], a complete analysis of the sociological interview results is in Table 1.

2015-2016 study was supplemented by the interview with more than 300 habitants of the Nizhni Novgorod Region of different age-grade, where assessment was “on actual basis”.

Table 1

Sociologic assessment of population life quality components for 2010-2016, score

Components that characterize population life quality	Life quality assessment by population on a scale from one to ten						
	2010	2012	2014	2015 prediction	2015	2016 prediction	2016
General economic development level	6.6	6.02	5.76	4.94	5.04	5.82	6.78
Population material well-being level	6.36	5.98	5.86	4.68	5.08	5.90	6.41
Medico-ecological service level	5.98	5.94	5.90	4.92	5.22	5.40	5.67
Culture-spiritual and patriotic development level	6.38	5.74	5.72	7.12	7.78	7.46	7.04
Average integral indicator	6.33	5.92	5.81	5.42	5.78	6.15	6.48

The sociological study has shown that the predictive assessments of the life quality of population in Russia were significantly worse than the actual assessments given by the respondents on the results of the preceding years. This can be due to both the general-political situation around Russia and the negative prediction for the results of imposed sanctions. As per the prediction, in 2015, the population life quality integral indicator was expected to be reduced by 7.96% compared to 2014, and the general economic development value – by 14.26%. According to the respondents, yet more significant reduction was predicted for the population material well-being indicator group from 6.36 scores in 2010 to 4.68 scores in 2015 i.e. by 26.42%. As is seen from the table, the pessimistic predictions were not came true; the population life quality category estimations have increased by 2016 and exceeded a little the level of 2010.

Figure 2 shows that three significant categories of the life quality population reduced in 2015.

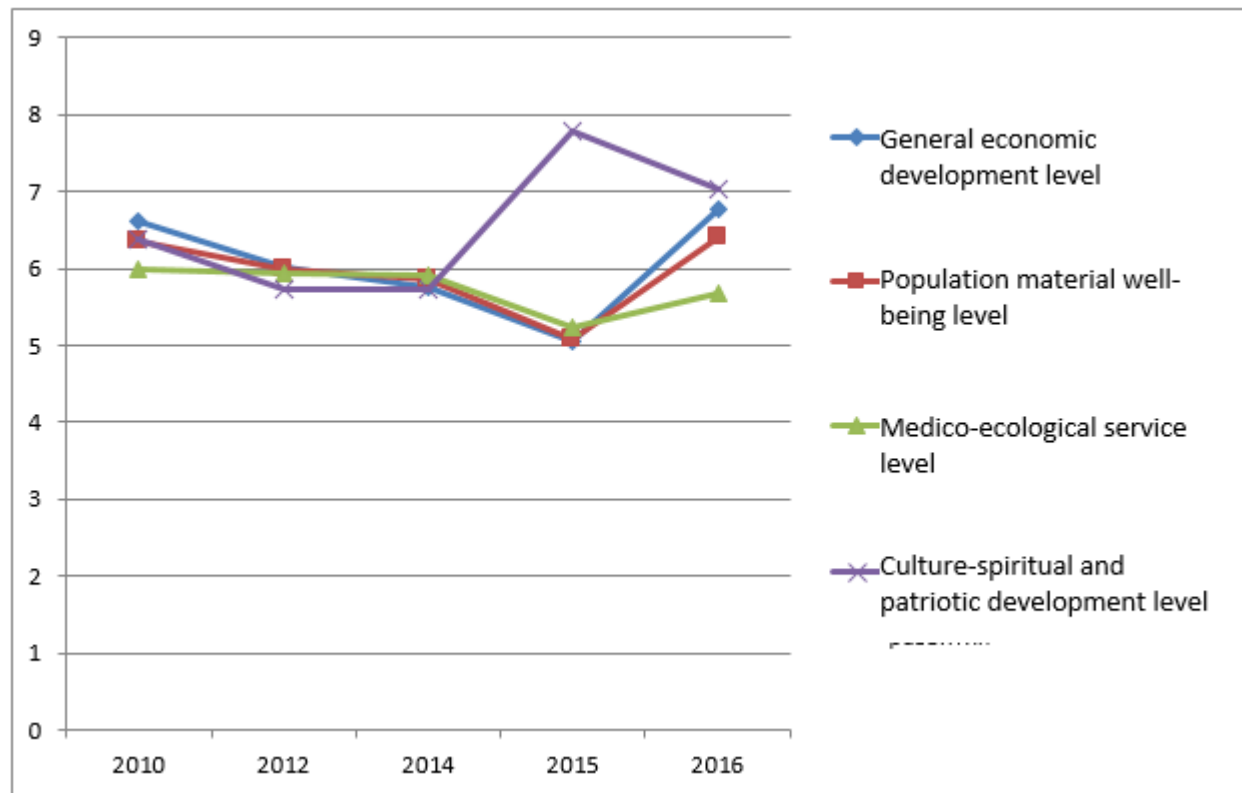


Figure 2. Sociological assessment of population life quality for 2010-2016 (actual)

Equalization of the integral indicator of population life quality is due to significant growth of the values for the indicator group of culture-spiritual (patriotic) well-being that has grown by 24.48% [7]. According to the respondents, it is mainly due to prolonged action of the earlier investments in the creation of sport and recreation centers over the entire region and in the mobilization of patriotic spirit among young people.

The predicted and actual quantitations of the population life quality categories are shown pictorially in Figure 3.

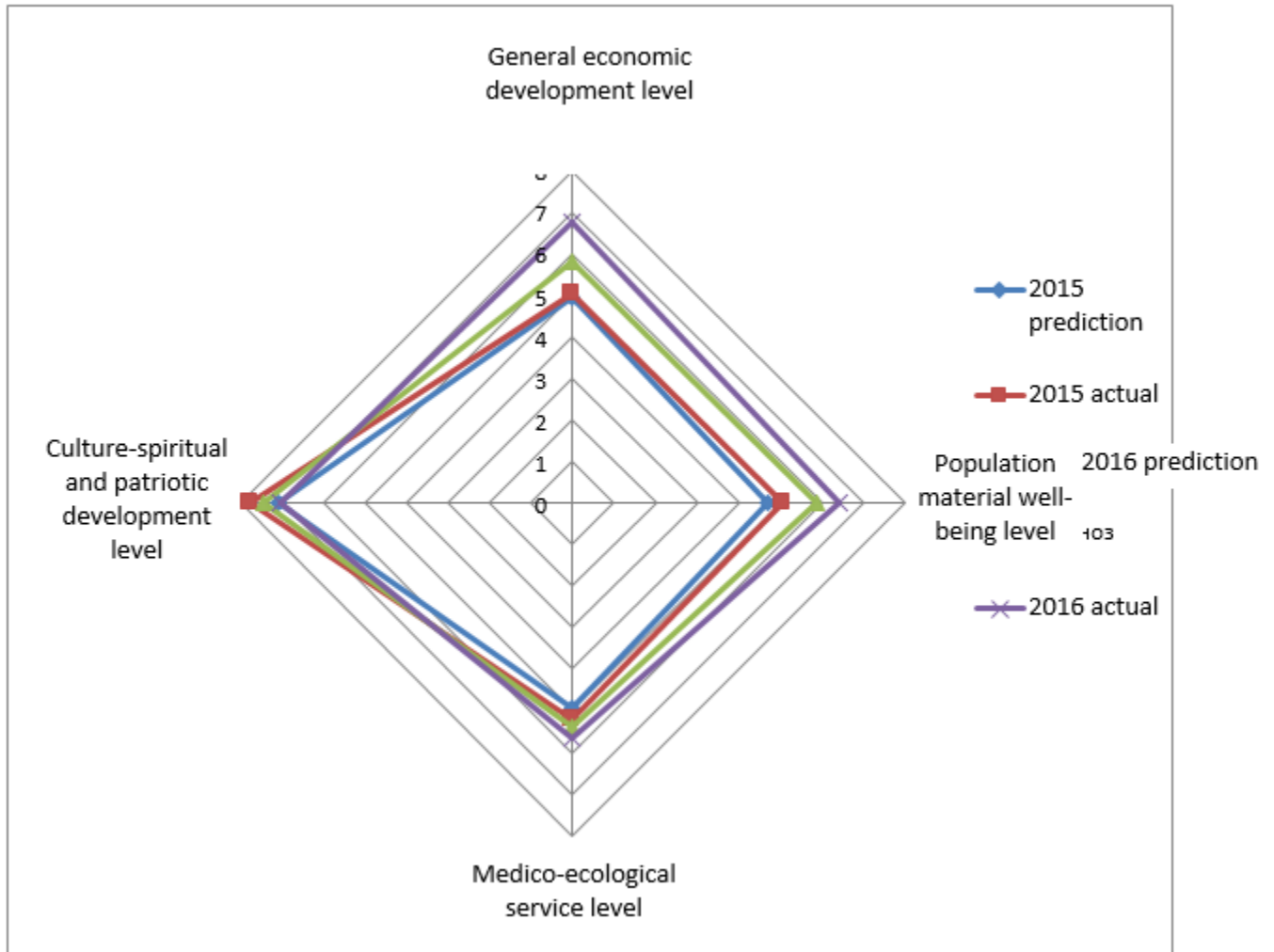


Figure 3. Sociological assessment of population life quality for 2015-2016 (prediction/actual)

Figure 3 data shows that by 2016 the satisfaction of population with the actual state of things in terms of the factor model of population life quality management was growing. All the categories were assessed above 5.57 scores on a scale from one to ten. By 2016, the people of the Nizhni Novgorod of Russia were satisfied with their material welfare assessed to be 6.41 scores and the general economic development level assessed to be 6.78 scores. The curve demonstrates pictorially the significant differences between

the predicted and actual population life quality assessments in coordination of the components of the proposed factor model. Within this study.

The problem of evaluation of the direct influence by activity of the government and municipal authorities on population life quality is extremely severe and topical. The studies show that the population life level and quality are depending largely on both the revenues of population and other components of social activity. The factory model of population life quality management proposed by the author allows assessing the indirect impact of environmental factors on population life quality, using the quantitative indicators; and from the analysis of this impact, the main management solutions in the area of institutional and investment territory development policy can be formed.

References

1. Zakharova S. G., Maslennikov N. A. Money income generation assessment within the institutional transformations of population life quality at the rural and municipal districts // Innovations and investments. 2013. No. 3. p. 89-92.
2. Zakharova S. G., Maslennikov N. A. The regular patterns of population life quality modification as an indicator of the institutional transformations in Russia// Economics and management of management systems. 2013. No. 2.1. p. 134-143.
3. Zakharova S. G., Kulagina E. N. Institutional innovative transformations of municipal district's social branches// Bulletin of Nizhni Novgorod State University named after N. I. Lobachevski. No. 2-2. 2012. p. 141-149
4. Zakharova S. G. Socially-oriented human recourses management at rural and municipal regions and its influence on population life quality// Bulletin of Nizhni Novgorod State University named after N. I. Lobachevski. No 3. 2016. p. 7-16
5. Zakharova S. G., Maltsev A. N. Municipal region management system assessment in population life quality criterion// Power.No.8. 2016.p.67-73

6. Participative approach to increase in population life quality: Monography. Under the general editorship of N. M. Rimashevskaya, N. N. Ivashinenko. Nizhni Novgorod—Moscow: Publishing office of Nizhni Novgorod State University, 2013. – 268 pp.

7. Zakharova S. G., Sergeichev N. Yu. The population life quality modification tendencies at rural municipal regions under the influence of program budget// Increase in managerial, economical, social, and innovative technical potential of enterprises, branches, and people economic centers. Penza: Collected works of VIII International research-to-practice conference.2016. p. 31-36

UDC 336

Zubarev I.S. Analysis of the bankruptcy of individuals: innovations and alternatives

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Abstract: This article highlights and analyzes new for the Russian Federation bankruptcy individuals. The work presents an analysis of newly introduced controversial provisions of the Law on Insolvency (Bankruptcy), based on the views of reputable lawyers, as well as on the work of academics in the field of law and economics. Also, the author gives a brief description of the most bankruptcy proceedings individual with lingua interpretation of the rules, as required in the law. Drawing a parallel with the legislation of Western countries, discussed the positive and negative aspects of innovation. These features of the legal regulation, and on this basis derived generalizations associated with the objects and advantages of production in individual countries. The basis of the study served as a law "On Insolvency (Bankruptcy)", demonstrated the imperfections of the legal framework, dedicated individuals. As a result of the material, the author concluded that the law is intended to regulate relations between citizens and the lending institutions to a greater extent. However, not all individuals who use innovations amendment in good faith, some not having the status of an entrepreneur can be a member of the cooperative, the shareholder, the owner of the share in the authorized capital of the entity, thereby deliberately expose themselves to action by authorized persons.

Keywords: insolvency, bankruptcy, an individual, the elimination of the debt, the creditor, the debtor, the arbitral tribunal

1. Introduction.

Globally, there are a variety of legislative approaches to solving the problem of so-called consumer bankruptcy, which involves the state of insolvency of an individual. On the one hand in a number of Western countries, such as France, Spain, Belgium, Italy, the recognition of insolvency of an individual is possible only if its relationship with the business. However, unlike the above-mentioned countries, in some countries there is a specific regulation, under which individuals have the right to get rid of their debts by way of a special handle production. Therefore, we have legal and economic regulation of the country will be studied in which the amendment has advantages in its practical application.

The emergence of the amendments to the law «On Insolvency (Bankruptcy)» in the form of Chapter. 10 «Bankruptcy of natural persons» [1], many academic economists attributed to the fact that the development of a huge consumer boom has led to excessively accessible elements of lending to individuals. The Russians took out loans for the purchase of a variety of subjects normal home environment, the acquisition of property and vehicles. However, the global financial crisis resulted in the consequences of not paying the debt on loans. Problem situations with non-payment of loans banks have passed on to collectors, with a view to the prompt their decision. But they were not always able to collect the debt, then the case was transferred to the court where the procedure could drag on for years. The results of these battles was the court's decision, which in most cases ignored the life circumstances of debtors, the court's decision on the side of the creditors.

2. Materials and methods.

The bankruptcy of a natural person is a kind of aloof, unlike bankruptcy of economic entities. First, an individual can not be in pure form to refer to the economic unity of the arbitration competitive process because of legal illiteracy or lack of knowledge of the law. And, in practice, all the participants of the case may seem that the debtor in the person of a citizen chosen the way of abuse of rights. In fact, a significant portion of individuals debtors do not even understand the legal nature of their situation and the consequences of bankruptcy.

Secondly, the individual is not in accordance with the Federal Law «On state registration of legal entities and individual entrepreneurs» business entity registered in the special register (register, EGRIP), so the individual bankruptcy procedures for individuals to practice do not give a tangible result.

Third, the individual itself, not having the status of an entrepreneur can be a cooperative member, shareholder, owner of the share in the authorized capital of the entity or have obligations that are inseparably linked with his personality. Here, in contrast to what has been said we can give an example, when, after the bankruptcy of a legal entity is liquidated, together with the commitments. With respect to an individual of such a process is not, as only the death of a natural person to a large extent cease his civil commitment. [2]

In Russia there is a change of the Insolvency Act of 2015, which provides for the texts that govern bankruptcy and individuals as an independent institution. The main regulatory prerequisite for its use is to have debts that exceed 500 thousand rubles, and failure to pay them lasted more than 3 months. Allowed adoption of a plan of debt restructuring for a period of 5 years, and the appointment of a temporary trustee (administrative manager). At first, all property of the debtor's bankruptcy estate forms, to be implemented. From it are excluded: only housing and the land on which it is built, state awards, plaques, clothing for normal use, fuels, household appliances, if not more than 30 000 rubles.

Before you recognize a person bankrupt, the following procedures are permissible:

1. a) debt restructuring, which is carried out primarily by transferring payment and installments in time. The prerequisite for this is the fact that the debtor's permanent monthly income and the absence of convictions for economic crimes. It is used most often in the creditor bank, which is a new repayment plan with a term of a maximum of 3 years. Failure to do so the plan is allowed to proceed to the sale of the debtor's property;

2. b) an agreement between the debtor and creditors, they regulate their relationship and are confident that it is subject to execution.

At impossibility of settlement of the payment method and the recognition of a person bankrupt, the court deprives him of the right to dispose of their rights and appoint him manager. Since then, the transactions made without his participation, will be void. The consequences of the procedure associated with a number of restrictions, such as disqualification from engaging in commercial activities; temporary restriction to leave the country, the prohibition to engage in administrative functions within 3 years, within 5 years of a loan is not allowed to credit institutions. When establishing a fictitious process criminally liable to imprisonment for a term of 6 years.

The law is not completely finalized, jurisprudence is not, and therefore will be able to get away from the large payments of loans from credit institutions or from payment of taxes to the budget not only in real bankrupt, but also scams. To avoid such risks, the law establishes responsibility for fraudulent bankruptcy, that is, false information about their ability to pay debts. The penalty for such an administrative offense for citizens is provided from 1000 to 3000 rubles. Administrative proceedings also applies concealment of information about their assets, a penalty — from 4000 to 5000 rubles.

3. Results and Discussion

Bankruptcy individuals — is primarily to get rid of loans, or outright cancellation. In other words, the recognition by the state and creditors of insolvent citizen and termination in relation to him all sorts of persecution, demanding enforcement of a debt. Therefore, we conclude that can be made that in the conduct of proceedings in respect of business entities — the main aim is to maintain workable enterprises and solvency recovery. Most of the population is in a quandary, having

multiple loans and not having the financial ability to repay them. Exorbitant interest rates during the economic crisis, low wages and growing inflation are the despair of borrowers of credit institutions. It is no secret that the adopted amendment to the bankruptcy law will focus on honest debtors who really are in a state of objective impossibility to pay its debts. [3]

In total, our opinion is that an amendment to the law «On Insolvency (Bankruptcy)» in terms of Sec. 10 «The bankruptcy of the citizens' will to solve the accumulated problems in the relationship between banks and creditors. This law seeks to increasingly regulate relations between citizens and the lending institutions.

References

1. On Insolvency (Bankruptcy) of the Federal Law of 26.10.2002, № 127-FZ (with additional izmen.i entered into force on 01/01/2017..)
2. Popondopulo VF Bankruptcy citizens: the substantive and procedural aspects // Laws of Russia. An experience. Analysis. Practice. 2015. № 9. S. 3-10.
3. IS Zubarev, NA Pantyukhina Comparative analysis of the bankruptcy proceedings in the United Kingdom, the United States and Russia // Sustainable economic development of industrial enterprises collection of scientific papers on the materials of the international scientific-practical conference. 2015. pp 26-30.
4. Tychinin S.V. Consumer cooperation from positions of civil law // The lawyer. 2003. № 8. P. 6-10.

Environmental Risk Assessment

UDC 336.2

Rytikova K.A. Formation of system of indicators for analysis and evaluation of man-made of pollution

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Abstract: Review existing methods of assessing technogenic pollution. A new approach to the formation of a system of indicators to measure man-made pollution and the definition of "contamination zones" based on the matrix approach.

Keywords: environmental pollution, the integrated indicator of technogenic pollution, the level of pollution

In modern conditions the problem of the formation of the trust funds for environmental protection is to establish a mutual connection between the amount of pollution and the factors that have the greatest influence on her. Problems of optimization of interaction between the economy and ecology, the formation of scientific bases of ecologically balanced sustainable development are reflected in the works of P. Borshevsky, L. Miller, V. Palamarchuk, R. Coase [1], A. Pigou and a number of other authors. Some theoretical and practical aspects of establishing effective economic mechanism of realization of environmental and resource-saving measures are reflected in the works of T. Khachaturov, N. Fedorenko, K. Hoffmann, O. Balatsky.

2. Materials and methods.

At the present time to assess the level of environmental pollution use the following indicators: emissions of harmful substances into the atmosphere from stationary sources of pollution; emissions of harmful substances into the air from mobile sources; wastewater discharge into water bodies; the generation of hazardous waste [2].

The data that are published in the statistical yearbooks, characterize only the level of contamination on the single greatest contributor and do not allow to form an assessment of their cumulative effect. It is therefore necessary to develop a method for determining the total level of pollution for grouping of individual territories and prioritization of financial receipts.

It is therefore expedient to go across from the absolute values of level of contamination under influence of the separate taken factor, that is usually used in statistical collections, to relative indicators (conditional pollution units). For this purpose during the analysis of actual statistical data about the indexes of contamination assumption is accepted, that a 1 conditional pollution units (c.p.u.) corresponds to 1 thousand tons of emissions of harmful substances stationary and movable sources, 1 thousand tons of generated wastes and 1 million m³ of wastewater discharged (coming from the middle concentration of contaminants in the effluents of kg/m³ or 1 thousand tons of contaminants in 1 million m³ of effluents).

The integrated indicator of technogenic pollution recommended to calculate according to the formula (1):

$$TP_j = \sum_{i=1}^n Q_{ij}, \quad (1)$$

where TP_j — integral indicator of technogenic pollution of the j -th object of analysis (region, city, enterprise), c.p.u. ;

Q_{ij} — the amount the i -th type of pollutant j -th object, c.p.u. ;

i — type of factor of technogenic pollution, which has a negative impact. During the analysis are studied only the factors whose negative impact been recorded relevant documentary sources of information;

n — quantity of pollutants;

j — characteristic of the object of analysis.

Integral indicator of technogenic pollution allows us to characterize the contribution of each object of analysis in the general level of technogenic pollution of the object of analysis.

In order to assess the actual level of pollution the study area, as well as for the convenience of comparison, comparison and subsequent analysis of the object groups, it is advisable to assess the degree of technogenic pollution depending on the size of the object of analysis and population size within the object of analysis.

The following indicators recommended to be used for this analysis:

- an indicator of density of technogenic pollution;
- an indicator of anthropogenic impact on the social environment.

An indicator of density of technogenic pollution can define according to the formula (2):

$$IDTP_j = \frac{TP_j}{S_j}, \quad (2)$$

where $IDTP_j$ — an indicator of density of technogenic pollution of the j-th object of analysis, c.p.u./thousand km^2 ;

TP_j — integral indicator of technogenic pollution of the j-th object of analysis, c.p.u.;

S_j — area of the j-th object of analysis, thousand km^2 .

An indicator of anthropogenic impact on the social environment can define according to the formula (3):

$$IAI_j = \frac{TP_j}{P_j}, \quad (3)$$

where IAI_j — an indicator of anthropogenic impact on the social environment, c.p.u./ thousands of people;

TP_j — integral indicator of technogenic pollution of the j -th object of analysis, c.p.u.;

P_j — population of the j -th object of analysis, thousands of people.

The values of these particular indicators for the analysis of objects (region, city, enterprise) can take only positive values. Indicators may be equal to zero if concerning the present object is not fixed neither of pollution factors, that is «absolutely pure».

Average annual values of the indicators for the object as a whole is recommended to take as a criterial value. This will allow group the components of the object in accordance with the received average annual values of indicators and create a matrix approach to the definition of «contamination zones» (figure 1):

- Quadrant 1 — objects that do not require intervention by the state.
- Quadrant 2 — objects for which it is recommended the development and implementation of environmental measures.
- Quadrant 3 — objects for which it is recommended improved the manufacturing process to protect the public from the harmful effects of the identified factors and normalization of the ecological situation.
- Quadrant 4 — objects for which it is recommended the development and implementation of environmental protection measures, as well as the creation of landscaped parks and recreational areas.

	<i>IAI</i>	
2 quadrant	3 quadrant	<i>IDT</i> <i>P</i>
	<i>A (IDTP; IAI)</i>	
1 quadrant	4 quadrant	

Figure 1. The distribution of the units of analysis depending on the average annual values of indicators

The intersection of the axes is the point A with coordinates (IDTP; IAI) for the facility as a whole.

3. Results and Discussion.

Grouping of individual objects in the «contamination zones» allows:

- concretize main environmental issues related to the level of man-made pollution;
- identify the main existing social problems on the basis of the negative consequences of environmental situations;
- assess the extent of the negative impact of industrial production on the environment of the object of analysis in general;
- substantiate the feasibility and priority spending target budgetary funds of environmental natural environment at overcoming consequences of man-made disasters caused by the results of economic activities of industrial production;
- prioritize areas of financial resources from the centralized budgetary funds in the specific administrative area in the solution of environmental problems.

References

1. Coase, Ronald. The Nature of the Firm // *Economica*, Vol. 4, No. 16, November 1937 pp. 386–405.
2. Arief Anshory Yusuf, Budy P. Resosudarmo. Assessing the Value of Clean Air in a Developing Country: A Hedonic Price Analysis of the Jakarta Housing Market, Indonesia. Australian National University. Economics and Environment Network Working Paper, 2006.

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Kulikova T. I. Psychological problems of young people resorting to the Internet communication

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Abstract: In recent years the Internet is gaining the &&& audience. Internet is specific and bears little resemblance to real communication therefore requires detailed study. Some modern researchers argue that as a result of prolonged and regular Internet communications young people sooner or later are beginning to feel psychological problems. The analysis of foreign and Russian psychological researches on the issue of Internet communication has allowed to identify the main personal problems of young people. The article presents the results of an experimental study of the psychological problems of young people resorting to the Internet communication. The study involved 45 students from different universities in Russia at the age of 18 to 22 years. The general hypothesis of the study was in the statement that the Internet as a modern communicative medium contributes to the emergence psychological problems of young people, in particular: the manifestation of negative emotional states (the experience of depression); reduce the level of self-confidence and self-esteem; formation of uncertainty feeling the manifestation Internet addiction symptoms.

Keywords: Internet communication, psychological problems, young people

Introduction

In recent years there has been a fundamental change in the role and place of personal computers and information technology in human life. A.E. Voiskunsky describes three main types of needs that people meet on the Internet: communicative, cognitive and games [5]. Communicative need is met through e-mails, chat, forums, etc. A large part of modern social activity of young people is realized within the framework of interaction in online communities and, above all, social networks such as «VK», «OK (Classmates)», «My World», «Facebook». Social networks now account for more than 85% of Internet users. A typical user of social media — a man aged 18-24 years (96%).

Russian Internet users are actively using the network as a means of free expression of thoughts and feelings [2].

Basic psychological research on the problem of Internet communications aimed mainly at studying forms of communication like chat rooms and forums (I.S. Shevchenko, 2002; I.V. Romanov, 2005; T.A. Naumova, 2007; I.V. Andreev, 2008; G.S. Chichkova, 2008; A.A. Meleshnikov, 2010; A.V. Kuznetsova, 2011), as well as the analysis of the phenomenon of internet addiction (F.A. Saglam, 2009; N.I. Drepa, 2010; A.V. Grishina, 2011).

However, we are, to a greater extent, interested in the psychological problems of young people, arising from a long and regular Internet communications. One of the problems associated with the development of information technology, is the dependence on the Internet, or Internet addiction, intensively discussed in the medical, psychological and pedagogical literature (A.E. Voiskunsky, 2000; V.A. Loskutova, 2004; L.N. Yurjeva, T.Y. Bolbot, 2006; T.A. Naumova, 2007; V.L. Malygin, 2010; K. Young, 1998 — 2003).

For the first time the term «Internet addiction» was proposed by Dr. A. Goldberg in 1996 to describe the uncontrollable, painful thrust to the Internet. The constant use of the computer leads to the stress of man. Equally important is the fact that computer use causes damage to the social, psychological and interpersonal status of the individual [1; 3].

1. Young has found that Internet addiction is often linked with depression. Depressive patients who have difficulty in communication or social adaptation, often use the Internet to help overcoming the difficulties of interpersonal interaction in reality [6].

It was also found that Internet addicts often feel nervous, being “offline”, and students suffer from academic failure and deterioration of relationships (K. Young,

1997). John Suler highlights the effect of emancipation in which there are two options: the output of negative emotions and destructive satisfaction of needs (insult others, hacking sites), or the implementation of the possibility to be open and not close to some very personal aspects [4].

Materials and Methods

All of the above has determined the purpose to identify the psychological problems of young people resorting to the Internet to communicate. The empirical research was made with young people (aged between 18 and 22 years) who use the Internet to communicate in the amount of 45 people. All participants are students of different universities of Russia. Empirical research was conducted in the virtual mode of interaction.

We hypothesized that the Internet as a modern communicative medium contributes to the emergence of the psychological problems of young people, in particular: the manifestation of negative emotional states (the experience of depression); reduce the level of self-confidence and self-esteem; formation of uncertainty feeling manifestation of Internet addiction symptoms.

The analysis of foreign and Russian psychological researches allowed to identify basic personal problems of young people resorting to the Internet to communicate, and led to the choice of diagnostic methods:

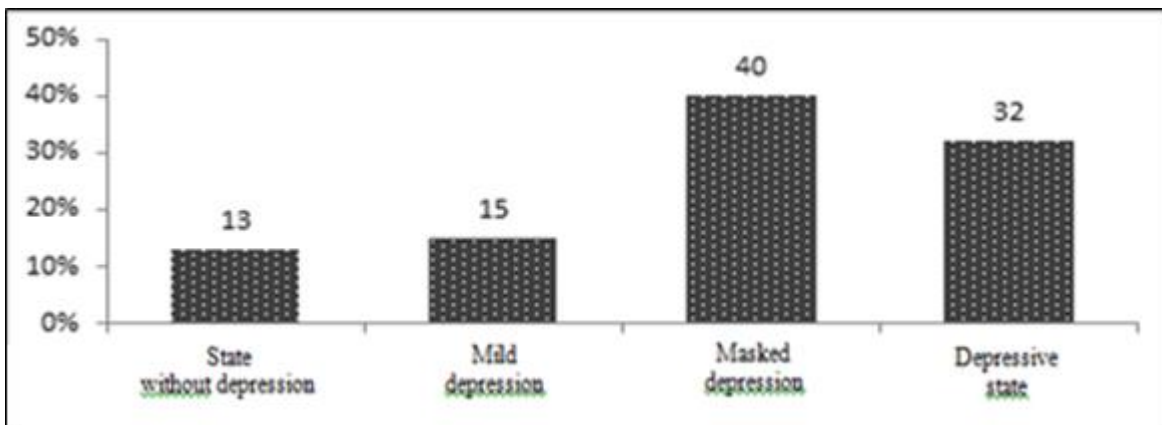
- Depression Scale (adaptation T.I. Balashova);
- Test-questionnaire of self-attitude (V.V. Stolin);
- Test of self-confidence (V.G. Romek);
- Questionnaire of attitudes towards the Internet (E. Gubenko).

When selecting methods we tried to take into account the positive assessment of the use and reliability of the method according to a number of foreign and Russian

researchers; availability of techniques for participants; the possibility of qualitative and quantitative analysis of the results.

Results

As a result of methodology » Depression Scale (adaptation T.I .Balashova)» found out that of the total sample of young people only 13% of participants showed a state without depression and 15% — mild depression. While masked depression and depressive state was found out at 40% and 32% participants respectively (Picture 1). These results suggest that young people prefer virtual communication, the level of depression is quite high.

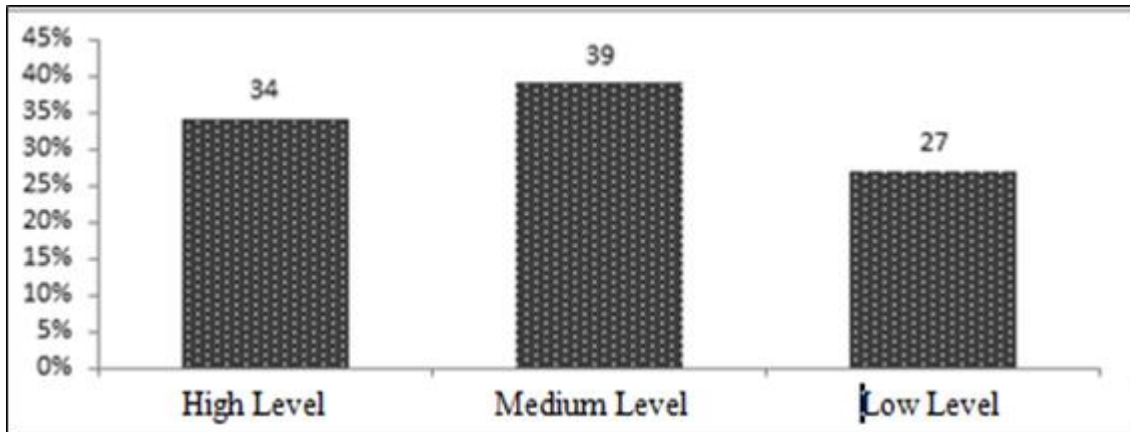


Picture 1. The level of depression in the group of testees

As a result of methodology «Test-questionnaire of self-attitude (V.V. Stolin)» we found out that 33% of respondents showed a low level of self-esteem, which indicates an internal conflict between the real and the ideal «I».

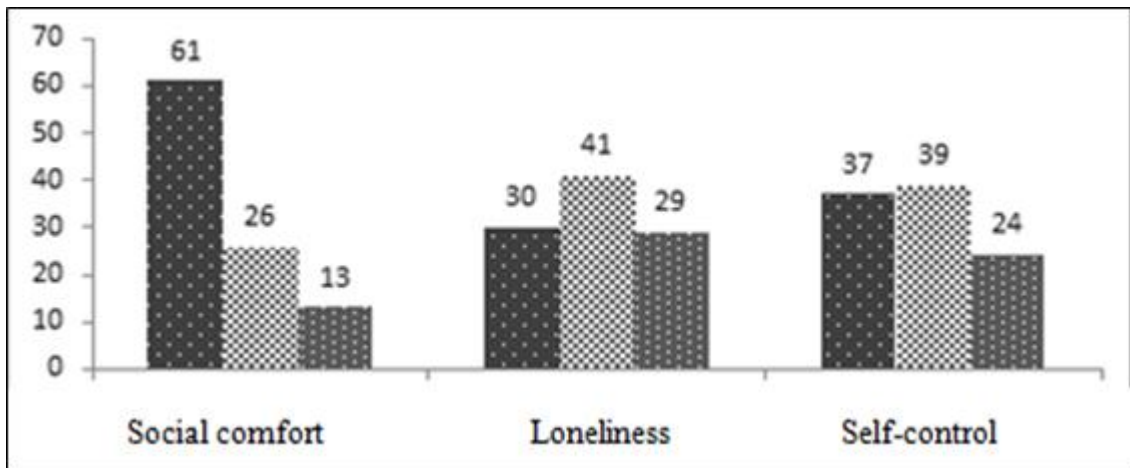
The results of the level of self-confidence on «Test of self-confidence (V.G. Romek)» indicate that 27% of testees are not able to make difficult decisions independently, to control their actions and their results. In the context of this study, it must be said that subjects with low indicator on this scale have difficulty in real

communication, they are much less come into social contact, while virtual communication appears to them as an alternative to real communication (Picture 2).



Picture 2. The level of self-confidence in the group of testees

In the Picture 3 the results of «Questionnaire of attitudes towards the Internet (E. Gubenko)» are presented: level of social comfort in the Internet, level of the presence of loneliness in real life and the level of the presence of obsessive thoughts about the Internet (self-control).



Picture 3. The level of social comfort, loneliness self-control in the group of testees

In the group of testees indicator of «social comfort» shows that 13% of the participants tend to use the Internet to achieve social comfort, i.e. be able to communicate with the others and to develop their own social network, and to achieve calmness and a sense of security through the membership of a virtual social environment even though that it is virtual.

It should be noted that high level on the scale of «social comfort» indicates a lack of faith in their own strength (61%) of the underestimated estimation of their possibilities, including the field of interpersonal communication. Such individuals are increasingly characterized by a low ability to control their own lives, make responsible decisions and to understand themselves.

The high level of the indicator on the scale of «loneliness» in the group of testees (30%) also indicates a sense of loneliness in the real world — and as a result of this — the involvement in the process of virtual communication as a way to supplement the deficit in interpersonal communication in real life.

At least, 24% of the testees revealed a low level of self-control, i.e. the inability to reduce the time of Internet which indicates the involvement of young people in the active use of the Internet as a means of communication.

The data of the empirical research allow to draw the following conclusions:

- a tendency to experience depression is noted;
- a lack of ability to make important decisions and take responsibility for their lives is noted;
- there is a low level of self-confidence combined with a high level of shyness index which indicates the difficulty in communicating in real life;
- the presence of loneliness in real life and a great involvement in the active use of the Internet as a means of communication is noted.

Discussions

In the theoretical analysis of the psychological literature on the problem of communication it was identified the main approaches to the study of communication problems and basic definitions of communication. It was concluded that communication is an important factor in the formation of a mature personality, in particular, for the period of early youth. The study found out that young men and women who prefer virtual communication show high levels of depression and situational anxiety; their self-esteem is significantly undervalued, ability to self-important decisions and responsibility for the results is underdeveloped; testees who choose the Internet as the primary means of communication do not realize sufficiently the connection between their actions and significant events in life, do not consider themselves able to control their development and believe that the majority of everything is the result of chance or other people's actions.

Thus, the Internet as a modern communicative medium contributes to the emergence of psychological problems of young people, in particular: the manifestation of negative emotional states (the experience of depression); reduce the level of self-confidence and self-esteem; formation of feelings of insecurity and the manifestation of Internet addiction symptoms.

References

1. Kulagina, Ya.M., Tarasova, I.Yu. (2014). Impact of Internet on today's youth. Actual questions of social sciences: sociology, political science, philosophy, history: Collection of works. XXXV International scientific-practical conference. №#3 (35). Novosibirsk: SeeBAC.

2. Kulikova, T.I., Maliy, D.V. (2015). Correlation between passion for computer games and school performance of younger schoolchildren. Psychology in Russia: State of the Art. Scientific Yearbook Moscow. #3. Pp. 124-136.
3. Morozova, O.N. (2010). Features of Internet communications: definition and properties. Bulletin of the Leningrad A.S. Pushkin State University. #5. Volume 1. URL: <http://cyberleninka.ru/article/n/osobennosti-internet-kommunikatsii-opredelenie-i-svoystva> . (Accessed 21 January 2017).
4. Suler, J. (1999). Computer and cyberspace addiction. URL: <http://www.rider.edu/~suler/psycyber/cybaddict.html> . (Accessed 21 January 2017).
5. Voiskunsky, A.E. (2002). Internet Research in psychology. Internet and Russian society. M.: Gendalf. Pp. 235-250.
6. Young, K.S. (2000). Diagnosis: Internet addiction. World of Internet. #2. Pp.24-29.

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