

ANALYTICAL PRISMS
Digest of Foreign Publications

QUANTITATIVE METHODS OF ANALYSIS IN INTERNATIONAL POLITICAL SCIENCE IN RUSSIA AND ABROAD

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Abstract

This article deals with the extent and specific character of the use of quantitative methods of analysis in international political science in Russia and abroad. Foreign publications were reviewed to show the place that quantitative methods and formalized modeling hold within the system of research methods discovered in articles published in the world's leading top-rated journals on international relations and political sciences indexed in the *Scopus* abstract database. The article describes the genesis of mathematical methods in foreign international political science and the basic mathematical techniques used by foreign international relations experts with reference to the main paradigms of the international relations theory. Special consideration was given to international conflictology which is, along with electoral studies, the most quantified subdiscipline of political science. The article covers the main schools of quantitative analysis of international relations that were formed in the USSR and Russia and lists the most significant literature reference in this field. The article shows the role that the Soviet and Russian schools of cliometrics and quantitative history under the leadership of academician I.D. Kovalchenko have played in the application of quantitative analysis to the humanities.

The author presents the results of his own research into the use of quantitative methods of analysis in papers published in six leading Russian scientific journals on international relations in 2014. The journals were divided into three groups: those that do not use or employ sporadically or regularly mathematical methods. The reasons are cited as to why the use of quantitative methods of analysis in Russian international political science is in its infancy. Some of them are related to the experience of the development of the Russian community of international relations experts.

An analysis was made of the main practical difficulties with formalized modeling of international relations, which involves an interdisciplinary synthesis, in education and research activities by international relations experts in Russian realities. A special emphasis was put on the shortcomings of mathematics textbooks adapted for humanities students and of the dedicated software required for quantitative analysis and visualization of the data acquired through research. The article describes the case of successful interaction between the PFUR Department of Theory and History of International Relations and the Departments of Applied Mathematics and Applied Information Science with a view to developing the international relations students' skills at quantitative analysis.

Key words:

quantitative methods; mathematical methods; formalization; interdisciplinary synthesis; modernism; game theory; system modeling; network analysis; international research methodology.

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Most social sciences make use of general scientific approaches and methods employed in other sociitarian and natural sciences. International relations (IR) also follow this pattern. Moreover, international relations researchers traditionally fall into two groups: those who favor the traditional historical-descriptive (logical-intuitive) approach and those who adhere to the operational and application-oriented (analytical-predictive) approach. The latter is largely connected with the use of methods of exact sciences, data formalization and evaluation (quantification) and verifiability of results.

The two approaches complement each other. It would be difficult to disagree with P.A. Tsygankov's view that "...theoretical concepts are constantly confirmed and corrected through applied research (that is actually feasible only at a certain quite advanced level of development) just as 'debt payment' to specialists in applied sciences in a form of a stronger and more operational theoretical and methodological basis" [Tsygankov 2007: 48].

With traditional analysis techniques experts in international relations benefit from a comprehensive picture but lack a detailed description. On the contrary, employing applied methods they have the advantage of an accurate scientific description but forego the opportunity to grasp all the aspects of the phenomenon as such research is conditioned by a number of assumptions that considerably limit practical application of the results obtained. It stands to reason that Dzh. Rozenau J. Rosenau, a prominent representative of the American school of the theory of international relations (TIR), insisted that it was necessary to use in analysis both quantitative and qualitative methods [Rozenau Rosenau 2008: 71].

The importance of combining research techniques typical of exact sciences and mainly descriptive, historical narrative research methods also arises from a dualism that is basically inherent in social studies and that was exposed, for instance, by Neo-Kantians of the Baden school (W. Windelband, H. Rickert and others). On the one hand, what it involves is *nomothetics*, i.e. determining common patterns in international relations. On the other hand, international processes can be largely explained

in keeping with *idiographics* by identifying individual characteristics of historical facts (for example, the individual's role in history) [Shabaga 2009: 101, 118].

As the system of international relations evolves and becomes more complex, the number of UN member-states grows; new forms of international cooperation emerge; modern information and communications technologies are introduced. Accordingly, new requirements are imposed on the quality of foreign policy evaluation by experts.

1

For several decades already, the world's leading countries have been using in their analytical work and when training international relations experts such tools as specialized databases, methods of mathematical statistics, game theories and even complex computer simulation models that allow forecasting changes in power balance on the world stage on the time horizon of 30–50 years.

As to the first-rate American and European universities, quantitative methods in international studies are understood to be, in the first place, statistical techniques of data processing. At the same time, foreign IR experts are working further along the second line – building formalized models, including mathematical ones, of international processes.

The Russian Federation as one of the most influential members of the international community and the successor to the USSR has extensive traditions of foreign policy application-oriented analysis that continues to be developed under the auspices of institutes of the Russian Academy of Sciences, higher education institutions under the MFA of Russia (MGIMO and the Diplomatic Academy), other leading universities (MSU, SPBU, PFUR) and research organizations (the Russian Institute for Strategic Studies (RISS) and others). The methodology of the research work underway has its roots in the structural-systematic approach founded in the 1970s by V.I. Gantman, A.A. Zlobin, E.A. Pozdnyakov, V.B. Tikhomirov, I.G. Tyulin, M.A. Khrustalev [Khrustalev 1987; Sistemnyi Podhod 1991; Grishin, Nikolsky 1982; Yazyk i modelirovanie sotsial'nogo vzaimodeistviya 1987].

Special mention must be made of a series of four publications on situational analysis of international relations prepared between 2010 and 2014 by the MGIMO Department of Applied International Analysis [Situatsionnye analizy 2011, 2012, 2013, 2014]. Interesting results were obtained during the implementation of the project “Comprehensive system analysis and modeling of international dynamics” under the guidance of V.A. Sadovnichy, RAS Vice-President and MSU Rector, [Modelirovanie i prognozirovaniye global'nogo, regional'nogo i natsional'nogo razvitiya 2012]. The work brought together a multidisciplinary team of experts in forecasting (A.A. Akaev [Akaev 2009], A.V. Korotaev, G.G. Malinetsky, S.Yu. Malkov and others). Other studies worthy of attention are those of the Centre for Situation Analysis RAS (director – Academician V.G. Baranovsky) established in 2011 on E.M. Primakov's initiative and also those of the RISS [Abaev 2011].

A number of monographs and textbooks on modeling and quantitative analysis of international relations have been published in recent years: “Introduction to applied analysis of international situations” edited by T.A. Shakleina [Vvedenie v prikladnoi analiz mezhdunarodnykh situatsii 2014], “Methods of Political Studies” by K.P. Borishpolets [Borishpolets 2010], “Political Analysis and Forecasting” by A.S. Akhremenko [Akhremenko 2006], “Modeling and analysis of political processes” by E.N. Ozhiganov [Ozhiganov 2009], “PFUR integrated interdisciplinary methodology of situational analysis of international conflicts” edited by D.A. Degterev, V.G. Dzhangiryan and V.A. Tsyk [Kompleksnaya mezhdistsiplinarnaya metodika RUDN situatsionnogo analiza mezhdunarodnykh konfliktov 2014], “Introduction to game theory for political scientists and international relations experts” [Degterev 2010].

Quantitative methods of analysis in Russian international political science and the history of international relations are also connected with the development of Russian *cliometrics* and *quantitative history*. These branches started to form as far back as the Soviet period. A substan-

tial contribution to their development belongs to I.D. Koval'chenko Kovalchenko, Academician of the Academy of Sciences of the USSR, [Kolichestvennye metody v gumanitarnykh naukakh 2003], T.I. Slavko [Slavko 1981], V.Z. Drobizhev and V.E. Poletaev.

Nowadays the leading Russian experts in this field are MSU Professor L.I. Borodkin [Borodkin 1986; Borodkin 1997] and members of the abovementioned multidisciplinary team (A.V. Korotaev [Zakony istorii 2010], G.G. Malinetsky, S.Yu. Malkov [Malkov 2009] and others) who specialize in mathematical modeling of historical dynamics and forecasting. Scholars at the Russian State University for the Humanities, the Faculty of History of the Altai State University, the Lobachevsky State University of Nizhni Novgorod and other higher education institutions also apply quantitative analysis to historical studies [Kharitonov 2002; Mityukov 2007].

More than 200 Russian experts in quantitative methods in historical sciences are members of the professional association *History and Computing* (since 1992)¹ and publish the scientific journal *Historical Information Science. Information Technology and Mathematical Methods in Historical Studies and Education* (Istoricheskaya informatika. Informatsionnye tekhnologii i matematicheskie metody v istoricheskikh issledovaniyakh i obrazovanii)².

As a rule, in quantitative history either long time series are analyzed or content analysis of archives is performed. Therefore, international relations experts may find interesting, for example, the work of A.V. Gorobii Goroby who studied the relations between the USSR and West Germany making content analysis of the press of the two countries [Gorobii Goroby 2012].

2

The ability to employ quantitative methods becomes *sine qua non* when it comes to preparing scientific publications for the world's leading journals contained in the international bibliometric databases Scopus and *Web of Science* (see Table 1).

¹Official web portal of the Association History and Computing – URL: <http://www.aik-sng.ru/>

²Web portal of Historical Information Science – URL: <http://kleio.asu.ru/>

Table 1
TOP-10 of the world's scientific journals on political sciences and international relations in 2013 according to Scopus

No.	Title	Hirsh Index	No. of Articles (3 years)	No. of Citations (3 years)	Country ³
1	Journal of Peace Research	48	167	555	Great Britain
2	International Organization	77	71	210	Great Britain
3	World Politics	62	59	175	Great Britain
4	International Security	59	94	220	USA
5	Journal of Conflict Resolution	61	122	250	USA
6	European Union Politics	26	85	207	Great Britain
7	International Studies Quarterly	50	174	302	Great Britain
8	Perspectives on Politics	25	124	323	Great Britain
9	Conflict Management and Peace Science	22	78	94	USA
10	Security Dialogue	25	103	246	Great Britain

Source: SCImago Journal & Country Ranking, Social Sciences, Political Science and International Relations, 2013. - http://www.scimagojr.com/journalrank.php?area=3300&category=3320&country=all&year=2013&order=sjr&min=0&min_type=cd

The analysis of publications in the journals *International Organization*, *International Security*, *International Studies Quarterly*, *Journal of Conflict Resolution*, *World Politics* and *American Political Science Review* for 1975–2000 showed that the portion of articles where statistical methods are used has considerably increased over the past three decades and has exceeded 40 per cent, while the portion of the articles with formalized models amounts to about 15 per cent (see Fig. 1).

While at the end of the 1970s historical-descriptive methods accounted for 70 per cent of articles in *World Politics*, by the end of 1990s the figure went down to 30 per cent. The journals *International Studies Quarterly*, *International Security* and *World Politics* have seen the sharpest decline in the portion of articles with historical-descriptive methods. On average, about half of the articles in these six leading IR journals of the world contain quantitative methods of analysis. As foreign researchers note, such an increase is due to both numerous databases that are being created and better skills in quantitative analysis that are acquired by international relations students, including

doctoral students [Models, Numbers, and Cases 2004: 5–7].

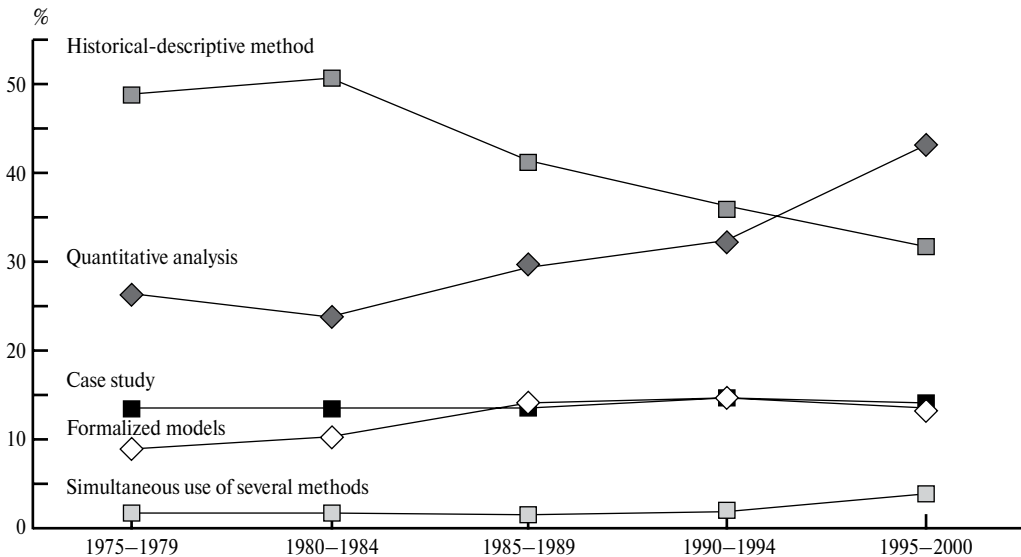
We should mention in particular the independent evaluation of scientific (monographic) literature on international relations that can be found especially in the papers by O. Waever [Waever 1998], A. Bennett and others [Bennett, et al. 2003]. The most comprehensive analysis in recent years was made by a research team under D. Maliniak [Maliniak, et al. 2011] with the help of a special database where they amassed data obtained by international relations researchers from 10 countries within the framework of the project “Teaching, Research and International Policy” (TRIP)⁴.

Their results in general confirm the above-mentioned conclusions. Over the period between 1980 and 2007, 12 leading journals on international relations and political sciences (except for the six journals from the research described above, namely *Journal of Peace Research*, *American Journal of Political Science*, *British Journal of Political Science*, *European Journal of International Relations*, *Journal of Politics and Security Studies*) had 13 per cent of articles with formalized models (game theory

³What is meant here is the country of publication, not that of editorial teams that are affiliated with universities and change from time to time. – Editor's note.

⁴Official site of the project “Teaching, Research and International Policy” (TRIP). URL: <http://www.wm.edu/offices/itpir/trip/index.php> [accessed 15.05.2015]

Fig 1
Methodology used to analyze international relations



Source: *Models, Numbers, and Cases 2004: 5-7.*

and gravity models), while the portion of articles with statistical methods (testing of hypotheses on the presence of an interaction between two or more variables) had steadily increased (especially in 1992–2006) and reached 53 per cent by 2007.

The authors of the research note, however, that outside the top-rated journals and in everyday practice international relations researchers mainly use qualitative methods of analysis (68 per cent mentioned them as their main analysis method against 23 per cent of those who prefer quantitative methods of analysis). It is particularly remarkable that the lower the respondents' age, the considerably higher the proportion of those who favor quantitative methods of analysis (more than 50 per cent of those under 30 prefer quantitative methods of analysis compared to only 8 per cent of the researchers over 65) [Maliniak, et al. 2011: 453-454].

Nowadays a number of the world's leading journals ask researchers to send the initial quantitative data and processing algorithms and post them on their web-portals together

with the article in order to ensure reproducibility of scientific findings. For instance, one of the world leading editions *Journal of Peace Research* has a separate section (Replication Datasets)⁵, besides archived publications, that contains initial data to check the analysis described in the articles and the processing algorithm. Replication data is provided for almost all the articles in the journal from 1998 onwards. The situation is similar in *Journal of Conflict Resolution* that has no separate section, yet most articles have a special *Data Set*, along with the text version, that includes initial data and algorithms. *The trend in foreign journals is that it becomes an essential element of scientific ethics to provide the initial quantitative data when articles are published.*

A remarkable scandal broke in 2015 around an article on political science written by two authors – Professor D. Green, a world leading expert in randomized experiments from Columbia University, and M. LaCour, a doctoral student at the University of California (who was responsible for collecting initial da-

⁵Replication Datasets. *Journal of Peace Research*. URL: <http://www.prio.org/JPR/Datasets/> (accessed 15.05.2015)

ta), – published by the top-rated journal *Science* [LaCour, Green 2014]. The readers analyzed the data attached to the article and discovered that the initial data had been falsified. D. Green eventually sent a letter to the editorial office with a request to retract the article [Editorial retraction 2015]. Leading foreign experts consider this example a testament to the fact that *political science is a science that can be quite exact and verifiable through quantitative methods, rather than a set of ideological clichés*.

3

The most fierce debate in the theory of international relations involving proponents of new “scientific” methods of analysis (including quantitative analysis and mathematical modeling) and advocates of the historical-descriptive method raged in the 1950s and the 1960s and was called “the second big argument” [Tsygankov 2007: 117]. Representatives of “modernism” in the analysis of international relations (such as K. Deutsch, M. Kaplan, Q. Wright, R. Rummel, B. Russett, D. Singer, O. Holsti, D. Zinnes) tried to overcome constraints of the traditional forms of analysis and to develop more systematic approaches to studying political phenomena.

American scholar D. Singer compiled a multi-author monograph “Quantitative International Politics: Insights and Evidence” [Quantitative International Politics 1968] in 1968 of 10 papers by the then leading international relations researchers where mathematical methods were used (quantitative content analysis, cognitive mapping, correlation and factor analysis). As a significant number of the chapters were devoted to modeling decision makers’ behavior and to mutual perception of nations, all adherents of modernism were quite often called “behaviorists” though it is just one branch of the positivist movement in international political science.

When they employed analysis methods used in natural and exact sciences for political theory, at the first stage “modernists” faced severe criticism from “traditionalists” [Petrovskii Petrovsky, Petrovskaya 1974; Kaplan 1966]. As natural sciences tools became better adapted to international political science with its specific

traits, and the interdisciplinary synthesis was enhanced, in American international political science (that is in the forefront of the foreign theory of international relations) a consensus emerged within the framework of which new and traditional research methods complemented each other.

Most European experts are rather skeptical about the American penchant for scientific methods, including quantitative analysis. In such countries as Norway, Sweden and the Netherlands, however, it has become a frequent practice to use mathematical methods for international relations analysis [Klingemann 2008: 111].

The first stage of quantitative research mainly concerned international security. D. Singer’s computer database “The Correlates of War” dedicated to international conflicts promoted a rapid development of statistical studies in this field [Melikhov 1979]. In fact, international political science saw a kind of subdiscipline take shape, and it was connected with the analysis of international conflicts and made exceptionally extensive use of mathematical methods of analysis.

Some insight into the methods used to analyze international conflicts can be gained from the matrix of American researcher M. Intriligator (see Table 2) where he showed eight analytic techniques that are most often employed in this area (row names) and eight separate subsections of international conflict management (column names). The author did not include in the studies statistical methods of analysis, case studies, empiric studies and a number of related fields, for example, military tactics [Intriligator 1982].

This table is analogous to a chessboard with 64 squares some of which contain ‘–’ (this means that the analysis method is not used in this area of international conflict management), ‘+’ (the method is used but not often) and ‘+++’ (the method is frequently used). The table includes 15 squares marked with ‘+++’, and for each case the author provided an extensive bibliography. As the Table shows, in some cases the analytic approach implies a separate branch of mathematics (differential equations, game theory); but more often what

is meant by it is more comprehensive mathematical research related to the system behavior and decision-making (decision theory / system theory, stability theory, organization theory, uncertainty) or to the interaction of individual agents (bargaining theory, action-reaction models).

In the 1980s and 1990s quantitative analysis became widely used in international political economy as well as in research conducted by international organizations.

Although quantitative methods in use are quite diverse, four main techniques remain the most extensively used in international relations analysis nowadays:

(1) Mathematical statistics (primarily regression and correlation analysis) that is instrumental in determining the dependence between phenomena or actions of the players in the international arena and in testing the validity of the hypotheses suggested. This very set of methods is usually meant by quantitative analysis in foreign international political science. It is used by representatives of the majority of positivist branches of the international relations theory.

Mathematical statistics is, however, criticized by supporters of the systematic approach for verification of separate variables taken out of the context [Mearsheimer, Walt 2013].

(2) Game Theory that helps to identify shared and opposing interests of states in the international arena, to define optimum international coalitions and to determine how to make international agreements mutually acceptable. Game theory is usually applied to create formalized models [Degterev 2009]. As it is based on the assumption that players make rational and individual choices, followers of the liberal paradigm in the international relations theory use this tool more often.

(3) Network analysis that makes it possible to create a formalized description of the network of international interaction and then perform mathematical analysis of the graphic representation. This analysis was widely used by adherents of the neo-Marxist world-system theory and also by researchers who were engaged in data formalization within the framework of the neoliberal theory of complex interdependence [Degterev 2015].

Table 2
International Conflict Management: Analytic Approaches and Areas of Application

Analytic Approach	Area of Application							
	1. Arms Race	2. War Initiation/ /War Termination	3. Military Strategy/ /Conduct of War	4. Threats/ /Crises/ /Escalation	5. Qualitative Arms Race/ /Arms Control	6. Alliances	7. Nuclear Proliferation	8. Defence Bureaucracy/ /Budgets
A. Differential Equations	+++	+	+	+	—	—	—	—
B. Decision Theory/Control Theory	+++	+++	+++	+	+++	—	+++	+++
C. Game Theory	+++	+	+++	+	+	+++	—	+
D. Bargaining Theory	+	+	—	+	+	—	—	+
E. Uncertainty	+	+	+	—	+	+	—	—
F. Stability Theory	—	+	—	+	+	+++	+++	—
G. Action-Reaction Models	+	+	—	+++	+	+	+	+
H. Organization Theory	+	+	+	+	+++	+	+	+++

Source: [Intriligator 1982: 310-311]

(4) The system theory and system analysis as well as differential equations that facilitate simulation modeling of the international relations system (through agent-based modeling or system dynamics) and are instrumental in international development forecasting. Research into system dynamics largely reflects the realist paradigm of the international relations theory, while agent-based modeling that has become increasingly popular over the past few years is connected with constructivist concepts.

When it comes to system dynamics, what is meant here is not the research conducted by an individual international relations expert but rather by big interdisciplinary laboratories and institutes. In Russia the work in this field is done by the abovementioned team under the guidance of V.A. Sadovnichy, MSU Rector and academician, and A.A. Akaev, foreign RAS member; the team runs the project “Comprehensive systematic approach and modeling of international dynamics” within the framework of the basic research program of the RAS Presidium. Other participants, besides MSU, are the Keldysh Institute of Applied Mathematics of the RAS and other academic centers. Moreover, such models are usually multidimensional in character concerning not so much state-to-state relations as special aspects of financial and economic, social, demographic, scientific and technical development of individual countries, regions and the world as a whole.

Quantitative analysis of international relations is successfully developing in research practice both in Russia and abroad. Presently, large scientific centers do such work in the field of strategic research, studies into international conflicts, issues of war and peace, international negotiations and cooperation. Russian organizations of this type include the Russian Institute for Strategic Studies (RISS), the Lomonosov Moscow State University (MSU), the General Staff Academy, the Institute of World Economy and International Relations of the Russian Academy of Sciences (IMEMO RAS), MGIMO-University of the MFA of Russia, the National Research University Higher School of Economics (HSE) and the Peoples' Friendship University of Russia (PFUR). The leading role in this field is played

by foreign institutes and think tanks, including RAND Corporation, the Massachusetts Institute of Technology and divisions of the University of California.

4

The year 2014 saw the publication of a study made by A.P. Tsygankov and P.A. Tsygankov, two leading Russian experts in international relations; it covers the main trends in the development of the Russian scientific school and identifies the key notions, authors and journals of Russian international relations theory. However, the issues concerning the methodology applied were beyond its scope [Tsygankov A., Tsygankov P. 2014; Rossiiskaya nauka mezhdunarodnykh otnoshenii 2005]. Nevertheless, such an analysis is necessary. The earlier the Russian research community starts to discuss this issue, the higher the Russian school of the TIR can stand in the world rankings, as the diagnosis of a problem is the first step to its solution.

While preparing this article the author analyzed the methodology employed by the researchers that published their articles in six leading Russian journals on international relations in 2014 (*International Trends*, *World Economy and International Relations*, *Polis. Political Studies*, *International Organizations Research Journal*, *Vestnik of MGIMO-University and Russia in Global Affairs*).

The journals were selected according to a number of criteria. First, the study included the most highly cited journals on international relations (see Table 3)

A number of methodological clarifications and explanations are required. *First*, the study covered four journals out of this sampling, and did not include *International Affairs* that due to its institutional affiliation with the MFA of Russia has a very different format from traditional scientific journals because many of its articles reflect the official position on foreign affairs rather than being purely research papers. As to comparable foreign research papers, for a similar reason top-rated *Foreign Affairs* and *Foreign Policy* are excluded from the international relations sampling [Maliniak, et al. 2011: 441]. At the same time, *Vestnik of MGIMO-University* was added to our list and comes after

Table 3
TOP-5 of Russian scientific journals on political sciences for 2015 according to Russian Science Citation Index

Journal	Issues	Publications	Citations
Polis. Political Studies	157	2261	36602
World Economy and International Relations	228	2294	2862
International Affairs	162	1769	4374
International Organizations Research Journal	47	355	663
International Trends	36	713	1765

Source: <http://elibrary.ru/titles.asp>

Note. The following filters were selected 1) subject (Policy and Political Sciences); 2) in the list of peer-reviewed journals of the Higher Attestation Commission (VAK).

the TOP-5 in the international relations citation rating because such journals as *Power*, *Political Science*, *Political Expertise*, *Politeia. Analysis. Chronicle. Forecast and the Journal of Social Policy Studies* (ranking sixth to tenth) are mainly concerned with domestic policy processes.

Second, we used as a basis the rating of the journals important for the development of the Russian TIR compiled by A.P. Tsygankov and P.A. Tsygankov after a survey in which international relations experts took part (see Table 4). Therefore, we have made allowances for and added *Russia in Global Affairs* to the list of the journals under consideration. It is not in the list of peer-reviewed journals of the Higher Attestation Commission (VAK); it is predominantly expert analytical but it has a profound influence on the preferences of Russian international relations experts, however.

We reviewed the six selected journals to establish how often quantitative methods of analysis and mathematical modeling are used. A lot of statistical information (in *World Economy and International Relations*, *Vestnik of MGIMO-University* and *International Organizations Research Journal*) and opinion poll findings (in *Polis*) per se cannot be equated with the use of quantitative analysis. The data-handling procedure, primarily by means of formulas and by defining functions, should be described. Data formalization without quantitative evaluation has not been taken into consideration either.

According to the results of the analysis, all scientific journals on international relations can be divided into three subgroups.

The first subgroup includes *International Trends* and *Russia in Global Affairs* that had no

articles with quantitative methods throughout 2014. It would be fair to say that one calendar year is not representative to the full extent. For instance, in recent years D.A. Degterev alone published in *International Trends* two articles with quantitative methods of analysis of international relations devoted to game theory [Degterev 2009] and computer modeling [Degterev 2011]. Moreover, the preceding years saw the publication of a number of articles on methodology, including the quantitative one used to analyze international relations [Borodkin 2005]. The journal *Russia in Global Affairs* is aimed to a greater degree at creating a space of meanings and images and is close to the postmodern concepts of the TIR.

The second subgroup includes *World Economy and International Relations* and *Vestnik of MGIMO-University*, with 40–60 per cent of issues for 2014 having one article with quantitative methods (see Tables 5a and 5b). In most cases, however, these articles pertain to a greater extent to the domain of economic science. For instance, in *World Economy and International Relations* three articles out of five

Table 4
Journals to be read to promote the development of the Russian theory of international relations

Russian Journals (according to their relevance)	Expert Evaluation, %
International Trends	95
World Economy and International Relations	55
Russia in Global Affairs	50
Polis	33

Source: [Tsygankov A., Tsygankov P. 2014: 97]

Table 5a
Articles with quantitative methods of analysis in World Economy and International Relations for 2014

Issue	Number of articles with quantitative methods of analysis	Total number of articles (exclusive of reviews)
No. 1	0	8
No. 2	0	9
No. 3	1 [Khokhlov 2014]	9
No. 4	1 [Degterev 2014]	10
No. 5	0	11
No. 6	0	12
No. 7	0	11
No. 8	1 [Korzhenevskii Korzhenevsky 2014]	11
No. 9	1 [Alekseev 2014]	11
No. 10	0	12
No. 11	0	14
No. 12	1 [Lukashin, Rakhlina 2014]	11

were published in the section “Economy, Economic Theory” [Alekseev 2014; Degterev 2014; Korzhenevskii Korzhenevsky 2014], one article in the section “World of the Millennium” though it is concerned with forecasting of the economic situation in Russia [Lukashin, Rakhlina 2014], and only I.I. Khokhlov’s article on supranationalism in the EU fully relates to international political science [Khokhlov 2014].

Likewise, in *Vestnik of MGIMO-University* three articles out of four were published in the section “Economics” [Artamonovs 2014, Zav’yalov Zavyalov 2014, Shepeleva 2014] and one article in the section “Sociology” [Temnitskii Temnitsky 2014]. The section “International Relations” did not contain any articles with quantitative methods. In previous

years *Vestnik of MGIMO-University* published a number of articles with elements of quantitative analysis in the international political field. For example, an article of this kind was published in the section “Political Science” in 2013 [Degterev, Stepkin 2013].

All in all, the journals of the second subgroup publish on a regular basis articles with quantitative methods that concern various aspects of international relations, first of all the economic one.

The journals of the third subgroup comprise *Polis* and *International Organizations Research Journal*. Over the period in question they published 2–3 articles with elements of quantitative analysis in some issues (see Tables 5c and 5d). *International Organizations Research Journal* is by far the leader in this respect as it published nine articles of this kind in one year, and they account for about 25 per cent of the total (the highest figure among the leading Russian journals on international relations). However, articles in this journal mainly contain quite simple techniques of content analysis [Nagornov 2014; Lazutina 2014] and mathematical statistics [Didenko 2014; Vladimirova, et al. 2014], as well as conformity evaluation methods [Lazutina, et al. 2014; Kokotsis 2014; Kirton, et al. 2014; Larionova, et al. 2014]. A number of papers describe more complex models [Andersen Anderson, et al. 2014]; the whole research methodology, however, is not set out in detail, only its description and conclusions are given.

Articles in *Polis* contain the most comprehensive quantitative analysis with the development of fully-fledged econometric models and their empirical testing. However, over the said period all the articles with quantitative methods published in the journal concerned domes-

Table 5b
Articles with quantitative methods of analysis in Vestnik of MGIMO-University for 2014

Issue	Number of articles with quantitative methods of analysis	Total number of articles (exclusive of reviews)
No. 1	1 [Temnitskii Temnitsky 2014]	50
No. 2	1 [Artamonovs 2014]	53
No. 3	1 [Zav’yalov Zavyalov 2014]	43
No. 4	0	41
No. 5	Special issue dedicated to the 70 th anniversary of MGIMO (articles only on MGIMO scientific schools)	
No. 6	1 [Shepeleva 2014]	33

tic political processes [Nisnevich, Lokshin, Akhremenko, Buzin], though in the previous years the journal published quite a few papers of this kind directly related to international political issues [Timofeev 2009].

The above analysis shows that Russian experts have only begun to become familiar with quantitative methods in international political science. There are a number of reasons for this. In the Soviet period, though mathematical research itself was at a very high level in this country, quantitative analysis of social processes hardly had any support due to ideological imperatives and restrictions [Degterev 2009: 63-64].

International political research in modern Russia has not been as active in borrowing for-

eign methods as, for example, economic science or comparative political science. Schools of economic and political analysis supported by quantitative analysis were established with substantial assistance of foreign experts under the auspices of the National Research University Higher School of Economics, the New Economic School and the European University at St. Petersburg. Foreign partners had no special reason, however, for introducing tools for improving the analysis of foreign policy in Russia.

5

As quantitative methods took shape within natural science disciplines, and international political science belongs to social sciences, their introduction involves an interdisciplinary synthesis with a number of inherent difficulties.

Experts in social process modeling describe this process through the following diagram:

“humanities analysis” → *“model development”* → *“analysis of modeling results”* → *“humanities analysis”* [Belotelov, et al. 2013: 21].

A mathematical model is developed as a result of formalization in the course of study of the international situation. The process is understood to mean “...translation of familiar categories, concepts, notions of the humanities into the language of mathematical concepts (notions, algorithms and formulas)” [Belotelov, et al. 2013: 21]. At a later stage an optimal behavior strategy within the model formulated is developed through statistical analysis or logical operations with the help of information and communication technologies (ICT). This strategy is afterwards interpreted in terms of actions of the players in the international arena (see Fig. 2).

In practice, international relations experts with traditional training in their research area do not often use quantitative methods, while faculty members of mathematics departments are not familiar with issues of world politics. As a result, neither the former nor the latter are capable of performing full-scale mathematical modeling of international relations, to prepare fully-fledged scientific research using the instruments from natural sciences.

The related difficulty with applying quantitative methods in Russian international politi-

Table 5c.
Articles with quantitative methods of analysis in
International Organizations Research Journal for 2014

Issue	Number of articles with quantitative methods of analysis	Total number of articles (exclusive of reviews and the editor's comments)
No. 1	3 [Andersen Anderson, et al. 2014; Didenko 2014; Lazutina 2014]	10
No. 2	3 [Nagornov 2014; Vladimirova, et al. 2014; Lazutina et al. 2014]	12
No. 3	0	8
No. 4	3 [Kokotsis 2014; Kirton, et al. 2014; Larionova, et al. 2014]	9

Table 5d
Articles with quantitative methods of analysis
in Polis for 2014

Issue	Number of articles with quantitative methods of analysis	Total number of articles (exclusive of reviews and the editor's comments)
No. 1	1 [Nisnevich, Rozhich 2014]	12
No. 2	0	11
No. 3	0	11
No. 4	0	10
No. 5	1 [Lokshin 2014]	14
No. 6	2 [Akhremenko 2014; Buzin 2014]	13

cal science is *the shortage of natural sciences textbooks specially tailored for students of the humanities*. What we mean is the so-called non-technical version of mathematics. On completing this course international relations experts should have basic mathematical skills and be able to exercise them.

In practice, what is offered more often than not within the course “Further Mathematics for International Relations Students” is part of an ordinary mathematics course for natural sciences degree programs. In other words, students of the humanities are invited to study the whole mathematics program for physico-mathematical careers instead of a subject covering certain quite specific branches of mathematics that can be really helpful for international relations experts and offering the material in a form comprehensible to such students. The only difference is that the curriculum provides by far fewer hours to them; therefore they assimilate worse the material. After such a course the students will not acquire knowledge on the branches of mathematics that they really need (linear algebra, mathematical statistics, game theory) and will only get a vague idea of a great variety of techniques that they almost immediately forget and never use.

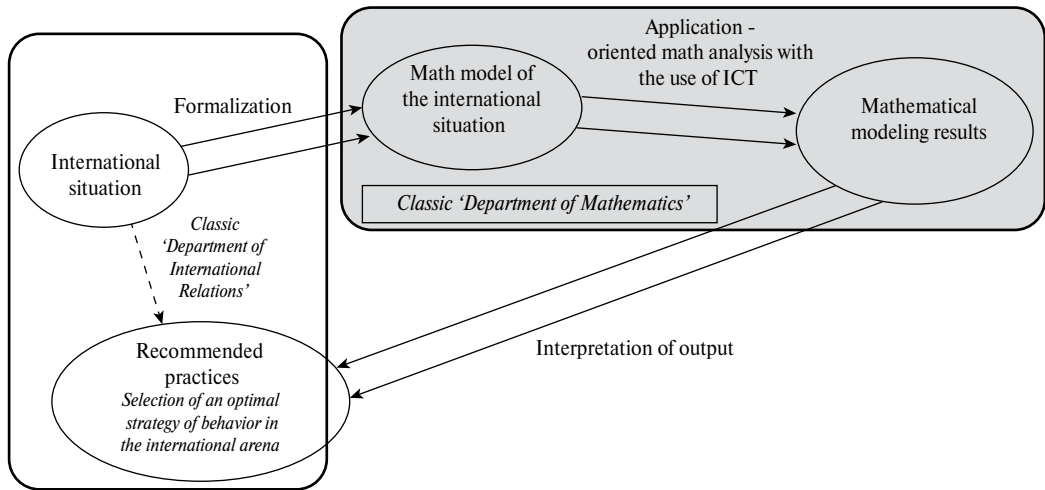
The successful interaction between the PFUR Department of Theory and History of

International Relations and the Department of Applied Mathematics shows that the basic course on further mathematics for international relations students should include the following subjects: the fundamentals of calculus, operations with vectors and matrices, elements of the theory of sets and mathematical logic, statistics and the theory of probability. At the same time, such branches as the queuing theory, linear programming, differential equations and integral calculus can be taught during more in-depth study of the application of mathematical techniques in international relations.

The third practical difficulty in performing quantitative analysis of international relations arises from the need to use specialized software and to acquire skills of working with databases as well as tools of visualization of the results obtained. The standard package of *MS Excel* enables users to apply most methods of statistical processing of data, but in certain cases it is practical to use such packages as *MathCad* and *SPSS* (for big databases). Special programs (for example, *Flying Logic*, *Fusion Tables*) and skills of using them are also required for quantitative content analysis and network analysis followed by drawing of diagrams of networking interaction.

Unfortunately, in practice researchers are sometimes unwilling and unable to perform the complete study cycle. They go quite often di-

Fig. 2. Mathematical modeling of international relations



rectly from the description of the international situation to practical recommendations bypassing the “unnecessary” stages of formalization, model development, parameter optimization and subsequent model interpretation. Such papers also have the right to exist as a review of publications on the research topic or as position papers. However, it is one thing when it states the position of an official, for example, one of the senior officials of the MFA of Russia who is authorized to lay out the country’s foreign policy, and it is a different thing when it is a “declaration” of a PhD student or a faculty member.

* * *

Quantitative methods of analysis of international relations are an alternative to subjective and intuitive forecasts of the development of the international political situation. Applied quantitative analysis and the building of formalized mathematical models are aimed at

identifying regular patterns inherent to international processes. These approaches make it possible to “digitize” certain parameters of international relations and thus switch to objective methods of their analysis.

It is well known, however, that the very formalization of real processes and the attempt to force them into the Procrustean bed of logically verified constructs without appropriate consideration of the context in question are the main reasons for inadequate forecasts made through this method due to the subjective (and quite often arbitrary) nature of decision-making by heads of state in the international arena.

Moreover, the use of quantitative methods of analysis of international relations in Russian education and research is fraught with a number of practical difficulties that should be resolved for the Russian school of international relations to be properly represented in global academic discourse.

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