Bibliometric Analysis of Economic, Social and Information Security Research

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Abstract

Issues of national security are of particular scientific interest because without it, it is impossible to imagine the existence of any state. Protecting the economic and social interests of the population has long been one of the prerogatives of public policy, which has expanded to information security of the people in the face of rapid digitalization of all spheres of life and the introduction of information attack as a new form of weapon. In this context, it is essential to conduct a thorough study of primary scientific papers on economic, social and information security. In this work, it is proposed to use quantitative and qualitative bibliometric analysis methods, which allows to identify the main trends and form a basis for further research. The information basis for this work was the international scientometric database Scopus and SciVal by Elsevier, which allows you to analyze bibliographic data using built-in tools and import them for external use in the software VOSviewer. Bibliographic information is presented from the 1930s to June 2021. The results show that in the world, the most researched is the topic of first, social, second, information, and third, economic security. At the same time, these studies are interdisciplinary, mainly at the intersection of economic and social sciences and information security at the intersection of economic and mathematical, computer sciences. The analysis of time trends changes the number of scientific papers on economic, social and information security in Scopus database shows their gradual growth. In contrast, information security has the fastest growth rate. The study of geographical trends shows that economic security research occurs mainly in the United States, the Russian Federation and Ukraine (the funding of research confirms this at the expense of the relevant ministries and foundations). Social security is mostly studied in English-speaking and European countries (United States, United Kingdom, Germany). Information security research is concentrated in English-speaking (United States, United Kingdom) and China, India. The qualitative bibliographic analysis allowed to analyze the most cited, and hence the trend works on selected topics, confirming the multidisciplinary nature of the work. In addition, a cluster analysis of co-occurrence of keywords was conducted, which formed clusters devoted to social, economic, socio-psychological, legal and other issues.

Keywords: economic security, social security, information security, bibliometric analysis, scientometric Scopus database, SciVal database.

JEL Classification: A13, F52.

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Introduction

The need to ensure national security arose simultaneously with the creation of the first state and remained a very relevant and urgent issue. If we briefly summarize its main essence, national security aims to protect national interests from possible external or internal threats. National security as a complex category covers all spheres of public life (economic, political, social, etc.) and is divided into separate subspecies. Within the framework of this work, it was decided to focus on one of the main types of national security that form its basis: economic, social...
and information security. The allocation of information security is due to the growing role and importance of digitalization processes in society. It is the key to the transition to a new type of social relations - post-industrial (information) society and a new threat - information attacks and wars. The study of any issue logically includes the analysis of existing scientific developments, which allows identifying the relevance, central areas of research and trends. In this regard, this work aims to conduct a quantitative and qualitative bibliometric analysis of research on economic, social and information security.

**Literature Review**

Studies of national security have deep historical roots and have been considered together with the formation of states. According to some scholars, the beginning of the concept of the same name is attributed to the 17th century (Holmes, 2015), which was originally associated with military power and defence. However, in the second half of the twentieth century, non-military ideas of national security began to take shape, which led to the emergence of new, more applied research. In particular, to date, many scientists have studied some issues and manifestations of macroeconomic (Bouchetara et al., 2020; Musa & Boychenko, 2018), energy (Salihaj & Pryimenko, 2017; Ziabina et al., 2020), food (Anderson, 2018; Peng & Berry, 2019), environmental (Zurlini & Muller, 2008), information security (Yarovenko et al., 2020), etc. However, these studies are incomplete and require a more systematic study not individually but in combination, which is why this work is devoted.

**Methodology and research methods**

Like any scientific research, this work began with collecting information on scientific papers related to economic, social and communication security, it's grouping, analysis and synthesis, tabular and graphical representation. All this formed the basis for quantitative and qualitative bibliometric analysis. For this purpose, data obtained from Scopus and SciVal databases were used as one of the most well-known international scientometric databases for the available period (depending on the category but is fixed as of June 26, 2021). The databases contain the necessary statistical information and developed built-in tools that help analyze scientific trends in time, geography, thematic, etc. For a more thorough qualitative analysis, the VOSviewer software was used, which allows the graphical presentation of information in visual cluster maps.

**Results**

First, we will conduct a quantitative analysis of research on economic, social and information security. Table 1 first presents the general results of search queries for the keywords "economic security", social security, information security in all available subject areas. Given the specifics of this study, the search query was narrowed by areas: Economics, Econometrics and Finance, Business, Management and Accounting, which is also shown in the table in an adjacent row. The third group displays additional metrics that provide a set of SciVal by Elsevier modules - the number of Topics (as a set of documents of general intellectual interest) and Topics cluster (as a combination of topics of similar research interest).

| Research category       | General number of scientific works | Specified number of scientific works | Additional SciVal metrics |
|-------------------------|-----------------------------------|-------------------------------------|---------------------------|
|                         | Scopus                            | SciVal                              | Scopus                    | SciVal | Topics | Topics cluster |
| Economic security       | 3,363                             | 1,669                               | 952                       | 936    | 353    | 137            |
| Social security         | 33,077                            | 18,258                              | 4,752                     | 4,555  | 847    | 229            |
| Information security    | 24,514                            | 24,737                              | 2,146                     | 2,163  | 569    | 189            |

Sources: compiled by author via Scopus Tools, SciVal of Elsevier.

Findings show that the country’s social security is a rather urgent problem, which economic scientists at the world level widely study. Information security is second place, reducing the number of works by narrowing the search for financial disciplines (because most of them were related to Computer Science). The issue of economic security is the least studied among the selected categories.
Obtained in the system of modules SciVal Topics cluster can be grouped by subject area in the form of a bubble diagram, which is formed based on their prominence (Fig. 1). The size of the bubble depends on the scholarly output of this research area.

**Figure 1. Distribution of topics cluster on economic, social and information security in SciVal database**

*Source: complied by author via SciVal of Elsevier.*

Analyzing the bubble chart in the category of economic and social security, we note that most topics cluster are grouped into financial (Business, Management and Accounting; Economics, Econometrics and Finance) and social (Social Sciences) subject areas that tend to be multidisciplinary. Regarding thematic clusters in information security, we see a focus on interdisciplinary subjects such as Environmental Science, Health Professions, and Veterinary Science.
security, there is a shift of research towards the exact sciences (Computer Science; Mathematics). Consider the top 3 topics cluster (most enormous bubbles in Figure 1) for economic, social and information security, obtained using the SciVal metric in Table 2. The system’s names are automatically generated by the system, which generally characterizes the articles included in it. For example, the first cluster of the economic security bloc, in our opinion, is incorrectly named because it has, among other things, institutional and managerial aspects of financial security, energy issues, and so on. The Prominence indicator, which according to the SciVal reference information is an indicator of momentum and is obtained as the average of the indicators of the number of citations, views and growth of CiteScore.

Table 2. Metrics for 3 topics cluster on economic, social and information security in SciVal databases

| Topic cluster                                      | Scholarly output | Publication share | Field-weighted citation impact | Prominence percentile |
|----------------------------------------------------|------------------|-------------------|--------------------------------|-----------------------|
| Economic security                                  |                  |                   |                                |                       |
| Students; Russian; Education (TC.1114)              | 238              | 0.85% decline     | 0.65                           | 77.324                |
| Monetary Policy; Economic Growth; Exports (TC.21)  | 46               | 0.05% growth      | 0.46                           | 94.448                |
| Industry; Innovation; Entrepreneurship (TC.24)     | 23               | 0.02% growth      | 0.79                           | 98.997                |
| Social security                                    |                  |                   |                                |                       |
| Monetary Policy; Economic Growth; Exports (TC.21)  | 492              | 0.51% decline     | 0.62                           | 94.448                |
| Pensions; Financial Literacy; Retirement (TC.1067) | 293              | 3.04% decline     | 0.63                           | 38.796                |
| Taxes; Tax Evasion; Tax Compliance (TC.920)        | 86               | 0.77% decline     | 0.62                           | 42.876                |
| Information security                               |                  |                   |                                |                       |
| Computer Crime; Network Security; Intrusion Detection (TC.218) | 566           | 0.81% decline     | 1.16                           | 95.518                |
| Cryptography; Authentication; Data Privacy (TC.84) | 93               | 0.10% decline     | 1.81                           | 97.993                |
| Industry; Information Systems; Research (TC.254)   | 80               | 0.22% decline     | 0.86                           | 87.023                |

Source: compiled by author via SciVal of Elsevier.

As can be seen from Table 2, the thematic clusters from the social security block are closely intertwined with economic issues and in the information security block - with computer science. Based on this information, it was decided to analyze further the narrow sample of scientific papers on economic orientation.

Let’s move on to further quantitative research of scientific papers on economic, social and information security in time. The first mention of financial security dates back to 1948 (in the form of a resolution of the Inter-American Conference for the Maintenance of Continental Peace and Security), social security – in 1937, information – in 1982. After that, the number of papers gradually increased. Figure 2 shows the change in the number of works on selected search queries from 1982 to 2020. As of 2020, the Scopus database presents 100 results related to economic security, 233 – social and 196 – information. At the same time, the growth of research on information security has a fairly rapid growth, which in 2019 was equal to the number of research on social security.
Figure 2. Dynamics of the number of scientific papers on economic, social and information security in the Scopus database for 1982-2020

Sources: compiled by authors via Scopus Tools.

The number of works on selected topics varies in the geographical dimension. That is why Table 3 shows the top 15 countries with the most significant number of scientific papers.

Table 3. Quantitative composition of scientific papers on economic, social and information security in Scopus database in the geographical dimension

| Economic security | Social security | Information security |
|-------------------|-----------------|----------------------|
| Country/Territory | Documents       | Country/Territory    | Documents |
| United States     | 530             | United States        | 3534      |
| Russian Federation| 365             | United Kingdom       | 1429      |
| Ukraine           | 233             | Germany              | 834       |
| United Kingdom    | 167             | China                | 507       |
| Canada            | 86              | Netherlands          | 425       |
| Australia         | 81              | Australia            | 408       |
| China             | 54              | Spain                | 375       |
| India             | 53              | France               | 364       |
| Germany           | 35              | Italy                | 334       |
| Kazakhstan        | 31              | Canada               | 333       |
| Poland            | 31              | India                | 281       |
| Singapore         | 28              | Belgium              | 253       |
| Netherlands       | 27              | Switzerland          | 231       |
| Sweden            | 25              | Japan                | 213       |

Sources: compiled by authors via Scopus Tools.

The leader of scientific research in all areas is the United States. Interestingly, economic security is widely studied in the Russian Federation and Ukraine (2nd and 3rd places in the top 15), and only then in such English-speaking countries as the United Kingdom, Canada, Australia. Social security is the subject of numerous studies in European countries (United Kingdom, Germany, Netherlands, etc.) and China. Information security is considered by scientists in the United States, United Kingdom, China, and the Russian Federation, India, South Africa and others.

According to the results obtained above, there is a distribution of scientific papers for funding sponsor. The leaders in the category of economic security are the Russian Foundation for Basic Research (19 works), the Russian Science Foundation (10 works), the Ministry of Education and Science of Ukraine (5 works) and the Russian Federation (4 works). For the social security category, the main funding organizations are U.S. Department of Health and Human Services (67 papers), National Institutes of Health (66 papers), U.S. Social Security Administration (58 papers), National Institute on Aging (55 papers), European Commission (49 papers). Research on information security is funded mainly by the National Science Foundation (35 works), National Natural Science Foundation of China (28 works), European Commission (13 works), Russian Foundation for Basic Research (13 works), Ministry of Education of the People's Republic of China (12 works). Thus, the study of information security in India, South Africa is mostly carried out by scientists themselves.

The next step is to move to a qualitative analysis of scientific papers. In table 3 we consider the top 5 most cited works in the Scopus database for each search query economic security, social security, information security. A qualitative analysis of the most cited works on selected topics allows us to draw the following conclusions. In general, the work on the economic security block concerns the impact of certain factors on it: scientific and technical, financial (through the prism of financial risks), social (development of entrepreneurship and financial inclusion among women), economic (through the formation of a more applied index of economic well-being). In addition, the social security block is related to issues related to the role of economic levers (e.g. government bonds, individual savings for the population) and social and labor issues (regulation of labor markets through employment laws, collective relations and social security, birth rate regulation). The works singled out in the
information security block are mainly considered at the meso level (business) and relate to the optimization of economic commerce and the prevention of systemic and other information risks in enterprises.

Table 4. TOP-5 most cited articles for search queries economic security, social security, information security in Scopus database

| Cited by | Authors | Document title | Source(Year) |
|----------|---------|----------------|--------------|
| 1354     | Partha, D., David, P.A. | Toward a new economics of science | Research Policy (1994) |
| 231      | Shiller, R.J. | The new financial order: Risk in the 21st century | The New Financial Order: Risk in the 21st Century (2009) |
| 179      | Datta, P.B., Gailey, R. | Empowering Women Through Social Entrepreneurship: Case Study of a Women's Cooperative in India | Entrepreneurship: Theory and Practice (2012) |
| 141      | Schuler, S.R., Hashemi, S.M., Riley, A.P. | The influence of women's changing roles and status in Bangladesh's fertility transition: Evidence from a study of credit programs and contraceptive use | World Development (1997) |
| 123      | Osberg, L., Sharpe, A. | An index of economic well-being for selected OECD countries | Review of Income and Wealth (2002) |
| 2195     | Barro, R.J. | Are government bonds net wealth? | Journal of Political Economy (1974) |
| 1131     | Madrian, B.C., Shea, D.F. | The power of suggestion: Inertia in 401(k) participation and savings behavior | Quarterly Journal of Economics (2001) |
| 977      | Botero, J.C., Djankov, S., La Porta, R., Lopez-De-Silanes, F., Shleifer, A. | The regulation of labor | Quarterly Journal of Economics (2004) |
| 699      | Ariely, D., Loewenstein, G., Prelec, D. | “Coherent arbitrariness”: Stable demand curves without stable preferences | Quarterly Journal of Economics (2003) |
| 598      | Becker, G.S., Barro, R.J. | A reformulation of the economic theory of fertility | Quarterly Journal of Economics (1988) |

Sources: complied by authors via Scopus Tools.

In addition to the qualitative bibliometric analysis, we will cluster keywords found in scientific papers related to economic, social and information security using VOSViewer software. The co-occurrence of keywords was chosen as the method of analysis. The data extracted from the Scopus database and processed in the program, which is normalized by the fractionalization method, were selected as the basis. As a result of clustering, the following results were obtained:

– for the economic security block (Fig. 3): based on 359 items (keywords) 6 clusters, 8050 links (co-occurrences) with 14944 total link strength (number of publications in which two terms occur together) were formed;
– for the social security block: based on 321 items 4 clusters, 7941 links from 19635 total link strength are formed;
– for the block of information security: based on 313 items, 4 clusters, 7504 links from 17951 total link strength are formed.
Cluster analysis for economic security is the most general, as it includes references to social and economic security. Let’s analyze the obtained clusters in Figure 3:

– the first cluster (red, 120 items) related to social issues of economic security: poverty, migration, employment and unemployment, working conditions, disability, etc. In particular, there is a category of social security;

– the second cluster (green, 116 items) related to economic security issues: energy security, financial security, foreign economic activity, business, economic policy, digital economy, etc. In particular, there is a category of information security;

– the third cluster (blue, 61 items) related to socio-psychological issues, in particular: the formation of social capital, living conditions and well-being of people, women, children, people with disabilities, displaced persons, etc.;

– the fourth cluster (yellow, 38 items) related to the legal aspects of economic security to ensure decent pensions, social assistance, care in case of illness;

– fifth cluster (purple, 13 items) related to the situation due to the coronary viral disease pandemic and its consequences;

– sixth cluster (blue, 11 items) related to issues of gender equality and relations in society.

Figure 3. Cluster analysis of co-occurrence of keywords on economic security in Scopus database

Sources: compiled by authors via VOSviewer.

As we can see, the research is closely interdisciplinary, manifested in the presentation of economic, social, and information issues to ensure the country’s national security.

Conclusions

This study was devoted to the quantitative and qualitative bibliometric analysis of research on economic, social and information security using Scopus database. To achieve this goal, the author analyzed the quantitative composition of scientific papers on specific topics, considered the dynamics of their change, subject areas and geography of distribution, qualitative analysis of the most cited works and cluster analysis of co-occurrence of keywords.

As a result, it was found that most research is devoted to social and information security, least of all economic.
The research of the subject areas in which these researches took place forced to narrow the search to the economic direction (Economics, Econometrics and Finance, Business, Management and Accounting). Numerous studies have been conducted in the social and computer sciences, which are not of scientific interest within our work. The first works recorded in the Scopus database date back to 1937-1982, after which the number of works gradually increased (with social security being ahead of others). Most research in all areas belongs to the United States. For economic security are Ukraine and Russia, social – English-speaking and European countries, and information security – China, Britain, Russia, India.

Qualitative analysis of the most cited works revealed the following trends: for economic security, works on factor impact (financial, social, scientific and technical indicators, etc.) are most often cited; for social security – on the role of economic levers and social and labor regulation; for information security – to prevent the loss of information and avoid other risks in enterprises. As a result of clustering of keywords found in scientific papers related to economic, social and information security, the interdisciplinarity of research is re-emphasized, as there are clusters related to social, economic, socio-psychological, legal and other issues.

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