



Knowledge Economy: An Intangible Assets Based Economy

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Abstract

The purpose of this paper is to offer a complete image of the knowledge economy topic, by conducting a literature review on the subject. The article presents the definitions and the way they were approached during time and by different authors both for knowledge economy and knowledge organizations, as components of the knowledge economy. We consider this study to be important by the contribution it brings in obtaining some needed clarifications in terms of knowledge economy. The objective of the paper is to offer a concise presentation of the reviewed topic, to present and to analyze the connections discovered in the literature between this topic and other major concepts. A bibliometric analysis was performed, using VOS viewer, in order to analyze the research trends regarding this topic. The data needed for performing this analysis were extracted both from the Web of Science and Scopus. Based on the collected data, the evolution in time of the number of publications that approached this subject and the countries where these publications were present were analyzed. Also, it was analyzed the intensity of the links between the most used keywords in relation to knowledge economy. The results of our study reveal that knowledge economy is very strong connected to innovation, knowledge management, globalization, human capital and intellectual capital, higher education, knowledge and education. Weaker than expected, link strengths have been identified when talking about competitiveness, information and communication technology. The conclusions of the paper explained those unexpected results, which are not in line with our findings from the literature review.

Keywords: knowledge society, knowledge economy, knowledge workers, knowledge organization

JEL classification: D8, F63, M21, N10, O11, O40

Introduction

The present paper aims to determine the way in which the concepts of knowledge industries, knowledge occupations, knowledge society, knowledge economy and knowledge workers, were presented in the specialized literature, from the moment they were enounced and what were the effects they produced on the current economy. We consider that it is very important to present the definitions that we identified in the specialized literature regarding the above listed terms. Moreover, the paper aims to analyze how knowledge workers have influenced the changes that have taken place in organizations operating the knowledge economy and, at the same time, how organizations have understood to take action in order to allow knowledge workers to reach their maximum potential. We also intend to identify the "pillars" on which the knowledge economy is built and what were the transformations within the organizations which supported the birth of the knowledge economy.

To begin, we believe that it would be useful to make a distinction between the concepts of information and knowledge, especially because many people consider the information society/economy to be the same as the knowledge society/economy. We consider that David, PA. and Foray, D. (2002, p.12) established a very important distinction between information and knowledge. The authors define the information as being a series of structured data that remain inert until the moment when, applying the necessary knowledge, they are interpreted and processed. Instead, knowledge offers the possibility to its owner to carry out manual and intellectual activities, practically representing the cognitive capacity of a person. Knowledge helps to structure, process, organize information, which is only meant to answer questions such as "who", "what", "where" and "when" (Graham, M.,2014, p. 189). In contrast, knowledge provides answers to the following questions: "know-what", "know-why", "know-how" and "know-who" (Bratianu, C., 2015, p.20). David, PA. and Foray, D., (2001, p.13) identify another difference between information and knowledge, namely that, while the reproduction of information involves low costs, referring only to the costs necessary for the actual reproduction, the reproduction of knowledge is a

much more expensive process due to the fact that sharing cognitive capacity is difficult.

On the other hand, Castells, M. (2010, p.77) shows that the economy that emerged in the last quarter of the 20th century is an "informational, global and networked economy". Regarding the informational nature of the modern economy, the author considers that productivity and competitiveness are decisively based on the ability of economic agents to create, process and effectively put into practice the knowledge-based information. In this respect, we can conclude that the knowledge economy is based on the benefits produced by the information society, which uses it in order to create and transmit an increasing level of knowledge. Agenda 2000, a document issued in 1997 by the European Commission, notes that the world's economy is rapidly moving towards globalization and the use of IT&C technologies, while mentioning, at the same time, that in order to maximize the benefits obtained from this process, it is necessary to pay more attention to policies related to knowledge (research, innovation, education and training) (Agenda 2000, 1997, p. 18-19).

The fact that the knowledge society is built on the foundation offered by the information society is perhaps the reason why Iancu, S. (2013, p. 65) considers that the term knowledge society could be better understood if the name of the information society-knowledge society was used. Rosca, M. considered that: "the knowledge society is only possible grafted on the information society and cannot be separated from it. At the same time, it is more than the information society, due to the major role of information-knowledge in society", which is why he also considers that the most correct term would be information and knowledge society.

Literature review

The Knowledge Economy

The terms knowledge industries and knowledge occupations were first used by F. Matchup in 1962 in the book "Production and distribution of knowledge in the United States". Williams, B.R. (1964, 174), in his book review, considers that its main merit is the fact that it manages to add two

new elements, the investment in people (education) and the investment in research, to the investment unanimously recognized until then by economists, respectively the investment in production capacities.

Later, in the book "Knowledge - Its Creation, Distribution and Economic Significance", F. Machlup defined knowledge industries (in the sense of a production unit) as those entities (companies, institutions, organizations, as well as departments and teams within them and even individuals or households) that produce, either for their own use or for the use of third parties, "knowledge, information goods or information services" (Machlup, F., 1980, p. 228). Knowledge occupations were those occupations particularly designed to generate, transmit and receive knowledge, regardless of their sort, type or quality (Machlup, F., 1980, p. 228-229).

In the paper "Production and distribution of knowledge in the United States", F. Machlup also introduced the terms of knowledge-producing workers and knowledge-using workers (Machlup, F., 1962, p. 383). Independently, Drucker, PF. (1969, p.10) introduced the term of knowledge workers, showing that changes in the economy require in particular a knowledge-based workforce, more than a workforce based on manual labor. This need arose due to the changes in the modern economy, which is also based on different sciences, logic and perceptions, not only on different technologies (Drucker, PF. 1969, p.10). Since 1959, Drucker, PF. noticed the change in the weight of production factors, emphasizing the increasing importance of organizational knowledge and professional knowledge, which are becoming the true "factors of production". The author also mentions that the classical factors of production in economics (land, labor and capital) tend to turn more and more into limitations on the efficiency of knowledge (Drucker, PF., 1959, p.62). Intangible resources (data, information and knowledge) have helped the knowledge economy to no longer be one based on poor resources, but on the contrary, an economy in which resources abound, although tangible resources are increasingly scarce and must be processed efficiently (Bolisani, E. and Bratianu, C., 2018, p. 25). Knowledge allows achieving this efficiency.

In the same direction, L. Nicolescu and O. Nicolescu consider that the knowledge-based economy (knowledge economy) is based on three pillars: *knowledge*, which becomes the content of buying, selling and production processes; *the transformation of knowledge into assets*, gaining a more important role than financial or technical-material assets; and the *capitalization of this intellectual capital* by creating a new terminology, new methods, new technologies and strategies (Rosca, IG., 2006, p. 63). The authors point out that, besides the role of raw material and factor of production, knowledge ultimately also has the role of product and capital (Rosca, IG., 2006, p. 61-62). Bratianu, C. (2015, p.19), identifying knowledge as being the most important intangible resource, emphasizes that it is inexhaustible, being continuously generated and, in addition, has the quality of not diminishing quantitatively when distributed.

In 1993, in the book "Post-Capitalist Society", Drucker, PF. considers that if initially knowledge was used to create tools, processes and products, in the economic development after the Second World War, knowledge leads to the development of new knowledge (Drucker, PF., 1993, p.17-18). The author considers that those were the premises that led to the apparition of the knowledge economy and quickly transformed knowledge into a factor of production, leading to a decrease in the importance of capital and labor resources. Referring to knowledge, the author shows that there are three ways to use them: 1. for the continuous improvement of existing processes, products and services; 2. for the creation of new processes, products and services; 3. for innovation (Drucker, PF., 1993a, p. 169). Also in 1993, Drucker, PF. summarized the transformations that led to the emergence of the knowledge economy: the knowledge previously applied only for "being", began to be used for "doing", started to be seen as a resource and as a necessity, turned from a personal asset into a public asset (Drucker, PF., 1993b, p. 53).

An important role in defining the knowledge economy has the 1996 OECD Report entitled "The Knowledge-based Economy". The report states, from the very beginning, that the term knowledge-based economy has its origins in recognizing the role that knowledge and technology have in the modern economy. The report also emphasized the

role of information, technology and learning in achieving economic performance, knowledge being thus recognized as an engine of productivity and economic growth (OECD, 1996, p.3). It is also stressed in the report that knowledge-based economies are directly based on the production, distribution and use of knowledge and information (OECD, 1996, p.7). A few years later, in 2000, the Report of the Economic Committee of the Asia-Pacific Economic Cooperation defined the knowledge-based economy as that economy in which: "the production, distribution and use of knowledge is the main engine of economic growth, wealth creation and employment in all industries". The report also emphasizes that all economic sectors have become knowledge-intensive, not only those generally referred to as "high-tech" (Asia-Pacific Economic Cooperation Economic Cooperation Report, 2000, p. vii). The development of the knowledge society led to the emergence of the concept of intellectual capital, capital that determined significant differences between the market value and the accounting value of a company (Bratianu, C., 2015, p.126).

A complex definition of knowledge economy can be found in the work elaborated by Hoffman, O. and Glodeanu, I. (2005, p. 428) which considers it to be the economy "that enables knowledge to be: 1. the basic resource; 2. the main source of power, prestige and welfare; 3. the main space of job generation and existence; 4. the means of action of the main new social actors; 5. the main area of new social conflicts; 6. the base for decision types (governance and innovative management); 7. the way of setting up the competition (knowledge means innovation); 8. criterion of national wealth" (Hoffman, O. and Glodeanu, I. (2005, p.428).

Referring to the knowledge economy, Cristea, D. and Matei, D. (2010) consider it to be a concept that, at a theoretical level, can be defined both as a knowledge economy, in which case the emphasis is on the production and management of knowledge and knowledge is perceived as a product, as well as a knowledge-based economy, in which case knowledge has the role of a tool used to produce economic benefits (Cristea, D. and Matei, D. (2010, p.145).

Archibugi, D. and Lundval, BA. (2001, p.2), emphasizing that in the contemporary economy knowledge is the main factor that leads to

economic health and development, consider the term "learning economy" to be more appropriate in relation to the "knowledge economy", given the speed with which individuals and organizations are forced to refresh their competences in order to cope with the problems they face. The authors consider that the "learning economy" is directly interconnected with the "globalized economy", the major impact that led to the development of both being due to the implementation of modern technologies. This approach is also supported by Drucker, PF., who believes that continuous learning is necessary, given the constant evolution of knowledge, so that, in order to achieve improved productivity, organizations must become organizations based on learning and on transmitting what they learn to others (Drucker, PF., 1993, 83). The idea is also expressed by Sabau, GL. (2001, p. 55), which shows that all branches of the economy require a more trained or even highly qualified human resource, which is why any country that wants to develop a knowledge economy must consider the investment in human capital as having a strategic importance. The author emphasizes that the human resource (human capital) is not the property of anyone, owning its own baggage of education, knowledge and qualifications, being more mobile and malleable in relation to the other factors of production. The investment made in human capital is of a longer duration, but, on the other hand, its value increases over time, by accumulating new knowledge and qualifications, while the value of the other factors of production diminishes through use (Sabau GL., 2001, p. 54-55). Rosca, A. (2012, p. 30) also emphasizes that, in the knowledge society, it is important that learning is carried out throughout life. The fact that learning and transmitting it to others through modern means of spreading knowledge are two essential factors for organizations that want to satisfy customer requirements and adapt to the competitive environment was also emphasized by Bennet, D. and Bennet, A. (2003, p.8). The authors consider the creation, storage, transfer and implementation of knowledge as very important resources of organizations (Bennet, D. and Bennet, A. (2003, p.8).

The knowledge Organization

The knowledge organization is regarded as an intelligent, complex and adaptive system, which recognizes that the intelligent application of

information and knowledge is an essential success factor, which uses information technologies to achieve high levels of efficiency and effectiveness, which build internal structures to mediate the relationships between employees who work for a common goal and that favor a working environment that allows sharing knowledge (Handzic, M. and Zhou, A.Z., 2005, p. 21). We would also like to highlight the fact that Handzic, M. and Zhou, A.Z. (2005, p. 20) present a series of terms under which the notion of knowledge organization is also known: agile production system, living organism, adaptive system, system with self-organization, virtual organization or knowledge-based organization. Choo, CW. (2006, p.1) uses the term of knowing organization, considering this as being more accurate than that of knowledge organization, because the knowledge within the organization is the result of joint actions undertaken within it, and the organization uses the knowledge it possesses in a conscious and consistent way. The author, in a previous paper (Choo, CW., 1996, p. 339), described knowing organizations as those organizations that are well-informed, intellectually receptive and whose actions are based on understanding the needs of the organization and the environment in which it operates, the actions being amplified by means of the knowledge and competencies of the employees. We can notice that, in the author's conception, the knowledge within the organization, in its entirety, becomes a common asset, located in the patrimony of the organization that, thus, gets to know, to be informed.

In a series of papers, Bratianu (2019), Bratianu and Leon (2015), Bratianu, Prelipcean and Bejinaru (2020), and Bratianu et al. (2011), the authors underline the mutations produced in the knowledge-intensive organizations and in their vision of becoming learning organizations.

Vreja, LO. (2011) considers knowledge as being a strategic resource for any type of activity, which allows organizations to be successful, to increase their efficiency and competitive advantage, allowing the design of new products and services and the establishment of a new-type relationship between seller and customer (Vreja, LO., 2011, p.1). On the other hand, Zack, MH., (2003, p. 67) considers that the approach by which an organization is considered to be a knowledge-based organization through the prism of its

products or services is wrong. In fact, the author believes a knowledge-based organization must be characterized by four distinctive elements. These are: the process (use of knowledge), the place (limits of knowledge), the purpose (strategy for using knowledge) and perspective (creating one's own knowledge-based image). In a knowledge-based society, processes must ensure both the use of already existing knowledge and the creation of new knowledge. On the other hand, in a knowledge-based organization, the information must be shared (Zack, MH., 2003, p. 68). Regarding the limits, the author notes that organizations give up, in the current economy, on the traditional limits of the organization (physical and legal) related to the creation and sharing of knowledge. On the contrary, the knowledge-based organization is a cluster of people and support resources that develop and apply knowledge through continuous interactions, both with customers and suppliers, but also with partners and even with competitors. Knowledge-based organizations are those that identify knowledge as a key strategic resource and constantly formulate the following questions: "what are our needs to know how to list and implement our strategy", "what do we know" and "what our competitors know". Regarding the knowledge perspective, the author considers that a knowledge-based organization uses knowledge as a primary factor in evaluating all operational aspects (organization, production, employment, localization, customer reporting, image, competition) and treats each activity as a possible factor able to generate knowledge (Zack, MH., 2003, p. 68). In this respect, Giroud, A. and Tucci, CL. (2011, p.5) consider that, within the current globalized economy, the essential factors for increasing the competitive potential of firms are technology, knowledge and innovation. Companies are able to develop technological skills in other countries, due to the intensification of international activities, both within the company and through an inter-company collaboration. We can say that there is a close correlation between globalization and the knowledge economy. On the one hand, the knowledge economy is an essential component of the current stage of globalization, and, on the other hand, globalization has allowed the development of the knowledge economy by making available to it technological, informational, communication and structural resources (Bedianashvili, G., 2018, p. 32), which allowed, in

our opinion, the creation of new knowledge and its sharing.

Regarding the exchange of knowledge between organizations and the environment in which it operates, Nonaka, I. and Takeuchi, H. (1995, p. 6) present how organizations in Japan act to gain competitive advantage. Organizations disseminate within themselves the knowledge gathered from external sources, turning it into their own knowledge capital, and use it to create new products and services. The two-way relationship between the company and the environment in which it operates, namely the taking over of knowledge from the outside and the rendering to third parties of new products and services, stimulates the innovation process. And permanent innovation allows Japanese organizations to gain competitive advantage (Nonaka, I. and Takeuchi, H., 1995, p. 6).

Gabe, T., Florida, R. and Mellander, C. (2013, p. 38) considered the crisis that broke out in the U.S. in 2008 as having, in addition to the financial and economic side, a structural component, respectively a confrontation between knowledge-based innovative organizations and conservative and outmoded ones. The authors believed that entities that have a richer package of knowledge and creative employees are able to reinvent themselves, innovate and bring new ideas, thus adapting better to economic recessions (Gabe, T., Florida, R. and Mellander, C., 2013, p. 38). The fact that the main factor of enterprise success is knowledge is also found at Wiig, KM. (1997, p. 6), which mentions a survey conducted with the help of Fortune 50 company CEOs, who believed that the viability of organizations is based on the ability to hold competitive knowledge assets and how they are exploited.

Nonaka, I. and Takeuchi, H. (1995, p. 162) consider that knowledge organizations (which they call knowledge-creating companies) share five common principles, two of which are the recognition of competencies, represented by unique abilities and technologies, and the consideration of intellect and knowledge as the main assets for the development of companies. Nonaka, I. and Takeuchi, H. (1995, p.8) presented the way in which organizations in Japan perceive knowledge. Unlike Western companies, which perceive only the explicit side of knowledge, Japanese organizations also perceive a tacit side of

it. The explicit knowledge, which, in the authors' opinion, constitutes only a small part of the knowledge, is that which can be expressed in words and numbers, which is why it can be shared, being presented in the form of data, scientific formulas, codified procedures or as universal principles. Along with these, Japanese companies consider the knowledge to be initially tacit, as it is difficult to communicate, to share and to formalize, given its personal nature. Tacit knowledge depends on the activity, experiences, ideals, values and emotions of each individual, being segmented into two dimensions: the technical dimension and the cognitive dimension. While the technical dimension contains personal abilities and aptitudes, known as know-how, the cognitive dimension refers to mental models, beliefs and perceptions that reflect the personal image of reality and in terms of perception of the future (Nonaka, I. and Takeuchi, H., 1995, p.8-9). The authors consider that organizational knowledge is reached by transforming the tacit knowledge into explicit knowledge, so that it can be understood by all the members of the organization and can be shared among them, and the latter will be converted into tacit knowledge. Thus, the two types of knowledge interact and are converted through four phenomena: socialization, outsourcing, combination and internalization. Thus, socialization helps to convert silent knowledge into silent knowledge, outsourcing leads to the conversion of tacit information into explicit information, explicit information being converted into explicit information through combination, while internalization leads to the transformation of explicit knowledge into tacit one (Nonaka, I. and Takeuchi, H., 1995, p.62).

In this paper, we also wanted to analyze what are the relationships established between knowledge workers and the organizations in which they work. The report of the Economic Committee of the Asia-Pacific Economic Cooperation (2000) defined knowledge workers as those workers "whose work is based primarily on the manipulation of symbols and presents a strong requirement of specialized knowledge" (Report of the Economic Committee of the Asia-Pacific Economic Cooperation, 2000, p. ix). The same report shows that a knowledge worker gains this quality according to the occupation he has and not according to the industry in which he works. Previously, (Machlup, F., 1962, p. 228-229) considered that knowledge workers working in non-knowledge industries produce knowledge

based on their occupations, while non-knowledge workers who are employed in knowledge industries contribute to the creation of knowledge through the prism of the industries in which they work. The same idea is found in Draganescu, M. (p. 21) who believes that in knowledge-creating companies every worker becomes a knowledge worker. This demonstrates that both the increase in the number of knowledge industries and the increase in the number of knowledge workers contribute to a greater increase in the capacity to create new knowledge.

Drucker, PF. (1999, p.83-84) considers that the productivity of knowledge workers is determined by six main factors, including the possibility of learning and sharing knowledge with others on a continuous basis, analyzing their productivity not only quantitatively, but also qualitatively, as well as perceiving them as a resource and not as a cost. The author considers that the knowledge workers possess their own means of production, respectively the baggage of knowledge, which is why they become very mobile. For this reason, a relationship is established between them and the organization through which both parties need each other (Drucker, PF., 1999, p. 87). Drucker, PF. (1969, p.185) considers that between knowledge-based organizations and workers with a high level of knowledge and qualifications there is a close interdependence, in the sense that the latter have made possible the existence of modern organizations, and, in turn, these organizations create jobs and opportunities for workers with a high level of knowledge. The author considers that knowledge worker, in the knowledge economy, has a double quality: on the one hand he is dependent on his job and on the other hand he becomes the real "capitalist", due to the fact that, through the participations he holds in different investment funds, or private pensions, he gets his own means of production (Drucker, PF., 1969, p. 259). And this in addition to their own means of production represented by their own knowledge. On the other hand, the author notes that, in the knowledge economies, knowledge workers become decision makers (executives) (Drucker, PF., 1969, p. 185). El Badawy, TA. (2012, p.274) considers also knowledge workers as the main source for the competitive advantage obtained by organizations. The author characterizes them as those workers who are continually looking for new sources of learning to add to official education (El Badawy,

TA.,2012, p.274). Ichijo, K. and Nonaka, I. (2007, p. 3-4) believe that, in this century, only those organizations that will be able to attract talents and permanently raise their intellectual level will be able to perform and obtain a competitive advantage, given that the competitive advantage is ensured by creating and sharing new knowledge. On the other hand, in the current period, knowledge can quickly become obsolete, which is why it is necessary to permanently create new knowledge (Ichijo, K. and Nonaka, I.,2007, pp. 3-4).

A description of the changes that occurred in knowledge organizations is also found in Kleinman, DL. and Vallas, SP. (2001, p. 461). Thus, the authors note that in this type of organizations, employees with scientific and technical functions have acquired powers and privileges that, in general, were characteristic only to employees of universities. Also, this type of organizations tries to give more autonomy to this type of employees, trying to fulfill their demands and redefine their work. Organizations, on the other hand, give up their vertical integration and at the same time begin to build networks in which there are strategic alliances and joint ventures made between large organizations and start-ups, specialized institutes and universities. And this way of interconnection between different types of organizations offers workers a high level of knowledge, greater autonomy, and stronger control over their work process (Kleinman, DL. and Vallas, SP., 2001, p. 461). Taking into account the fact that the development of the complexity of the activities leads to the need to have more and more specialized employees, with a high qualification, there was also the need to replace the administrative principle of vertical control with the occupational principle of horizontal control, this being another organizational aspect that leads to the increase of the autonomy of the workers with scientific and technical functions (Kleinman, DL. and Vallas, SP., 2001, p. 462).

Drucker, PF. (1969, p. 271) also mentioned that knowledge workers prefer a goal-oriented organization instead of an authoritarian one, because they prefer to be under the leadership of objectives and not under that of people. They need challenges to achieve results, because they perceive themselves as "intellectuals", as "professionals" and do not perceive work only as a means of existence (Drucker, PF., 1969, p. 271).

Grigorescu, A., Pelinescu, E., John, AE. and Dutcas, MF. (2021) consider human capital as an essential factor in the efficiency and growth of organizations, especially in the current context of digitalization, which is why they have begun to intensely look for people with skills and talents to make them special. This is all the more important as the current economy has become a center of innovation, technology, talent and skills, speed, efficiency and productivity, as well as satisfaction (Grigorescu, A., Pelinescu, E., John, A.E. and Dutcas, MF. (2021, p.1). In a previous work, Grigorescu, A. mentions a number of three characteristics of human capital, namely knowledge, skills and moral qualities, variables that make employees become the essential elements of an organization and a determining factor in terms of creativity, production and vision (Grigorescu, A. and Chiper, A., 2016, 78).

Methodology

The bibliometric analysis was used for analyzing the relevance of the knowledge economy topic in the specialized literature. The information for this research was extracted from two databases, Web of Science and Scopus, databases considered to be the most relevant in terms of scientific quality. The information from the databases was extracted on March 12, 2023, and the period included in this research starts from the date when the first article on this knowledge economy was registered in the databases and ends to the date of the export.

A number of 29.318 works were found in Web of Science and a number of 6.790 works were found in Scopus.

Figure 1 presents how the works found both in Web of Science and in Scopus are distributed, by years, over the analyzed period.

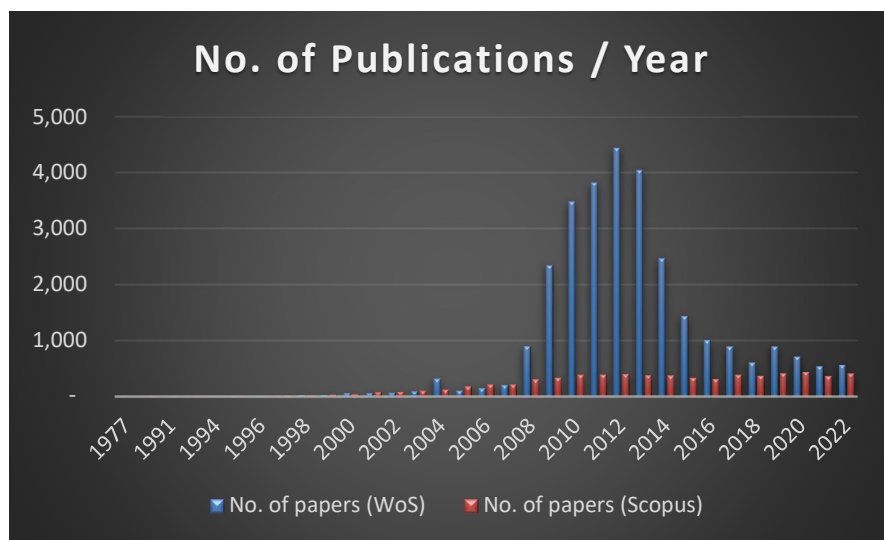


Fig. 1. Distribution by year of the papers having as subject knowledge economy

We can observe in the above chart that the largest number of papers on this topic was reported by

Web of Science in 2012 (4.438 papers) and by Scopus in 2020 (438 papers).

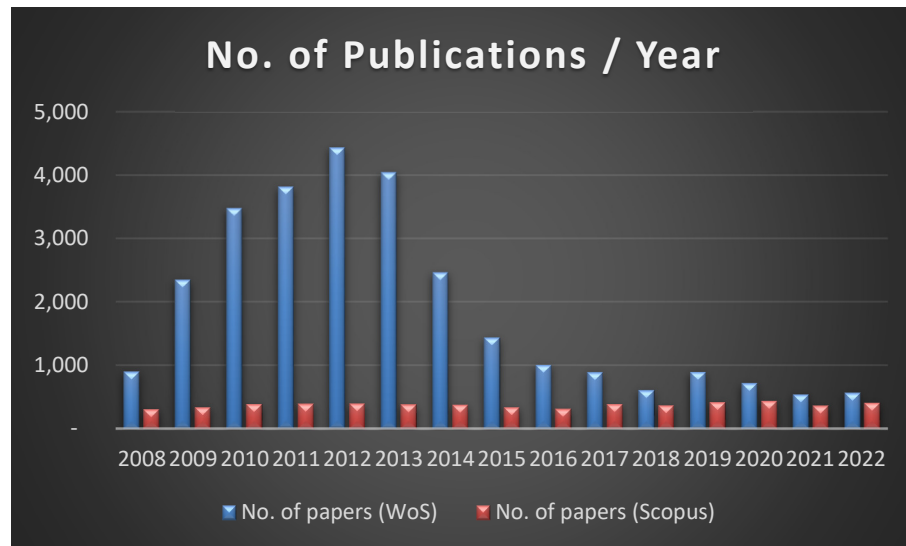


Fig. 2. Distribution by year of the papers having as subject knowledge economy (2008-2022)

Table 1 (bellow) highlights the list of top 20 countries where most of the papers were published during the analyzed period.

Table 1: Number of papers published in each country

Countries/Regions	No. of papers	
	Web of Science	Scopus
South Korea	21,186	72
People's Republic of China	2,364	860
United States of America	2,313	845
United Kingdom	1,446	925
India	543	235
Japan	462	47
Australia	432	59
Russian Federation	407	365
Canada	402	238
Germany	355	203
Romania	284	89
Italy	274	213
France	223	167
Spain	222	190
Taiwan	182	150
Slovakia	174	35
Netherlands	173	173

Czech Republic	171	56
Saudi Arabia	161	32
South Africa	155	174

Most of the papers were published in South Korea, respectively 21.186 papers, according to Web of Science, and, in the United Kingdom, 925 papers, according to Scopus.

A bibliometric analysis was performed using the information obtained from Web of Science and Scopus, and VOSviewer was used to process the data and obtain the bibliometric network. As it was already mentioned in this paper, the analysis was made using 29.318 works found in Web of Science and a number of 6.790 works found in Scopus.

The most intensively used keywords in relation to the knowledge economy were selected, in order to identify and analyze the connections established

Results and Discussions

The keywords that appear to be most intensively used in relation to the knowledge economy,

between them, considering only those words proposed by the authors as keywords in their works. We identified in Web of Science a total number of 56.563 keywords and we selected only 1.000 which meet the threshold of minimum ten occurrences of a keyword, and in Scopus a total number of 12.674 keywords were identified and only 603 keywords were selected, which meet the threshold of minimum five occurrences of a keyword.

From the keywords that met the above conditions, 65 most significant keywords were selected, both from Web of Science and from Scopus, considering the total link strength value.

keywords identified in Web of Science in the manner described in the methodology, are the following (Table 2):

Table 2: Most powerful 20 keywords connected with knowledge economy – Web of Science

Keyword	Occurrences	Total link strength
Knowledge economy	1149	984
Innovation	405	477
Knowledge management	350	299
Knowledge	156	241
Human capital	172	205
Intellectual capital	169	177
Education	115	176
Higher education	159	146
Globalization	126	137
Research and development	90	137
Competitiveness	81	132
Economic growth	118	121
University	91	117
Entrepreneurship	97	114
Information and communication technology	77	103
Knowledge society	67	100

Development	66	91
Management	65	75
Economic development	60	74
Human resources	96	67

A connection network was created between the main 65 keywords identified in Web of Science (Figure 3).

Knowledge economy is found in cluster 5 (purple) along with economic growth, corporate social

responsibility, human capital, information, information and communication technology, information society, Internet, knowledge society and machine learning. The strongest link strength is presented in Table 3.

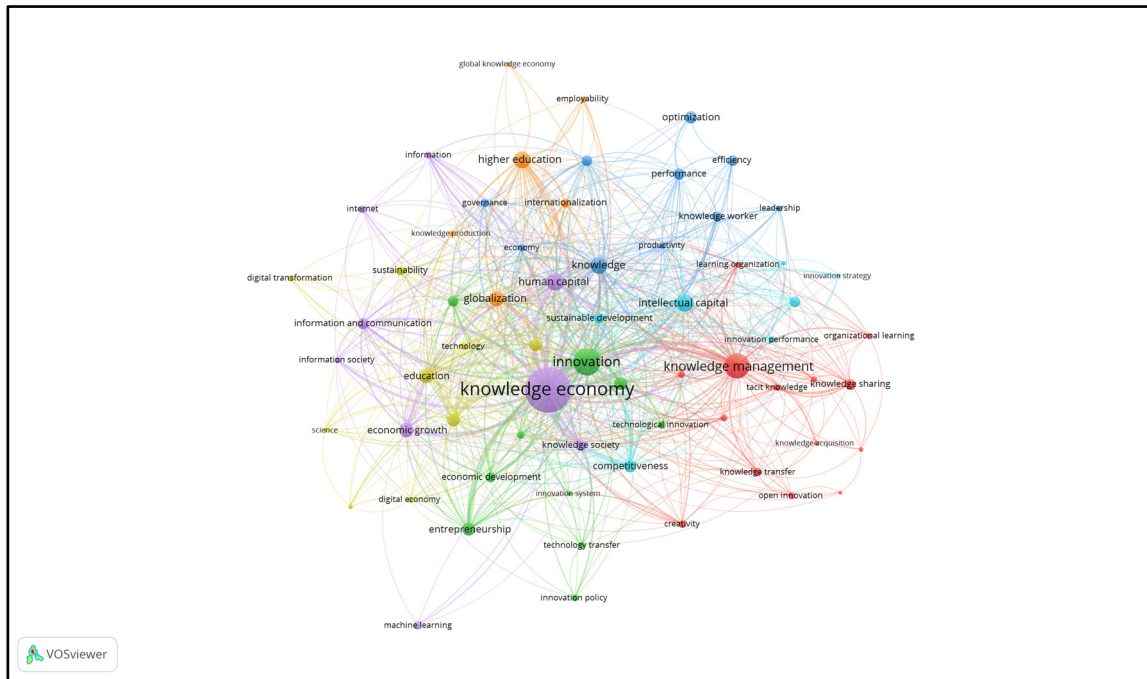


Fig. 3. The most widely used keywords related to knowledge economy (Web of Science) – by VOSviewer

Table 3: Main keywords connected with knowledge economy (Web of Science)

Keyword	Link strength
Innovation	116
Knowledge management	67
Human capital	51
Higher education	48
Knowledge society	44
Intellectual capital	41
Knowledge	40

Globalization	38
Competitiveness	35
Education	34

Innovation is the strongest keyword of cluster 2 (green) and knowledge management is the strongest keyword of cluster 1 (red).

keywords identified in Scopus in the manner described in the methodology, are as follow (Table 4):

The keywords that appear to be most intensively used in relation to the knowledge economy,

Table 4: Most powerful 20 keywords connected with knowledge economy – Scopus

Keyword	Occurrences	Total link strength
Knowledge economy	1446	1311
Innovation	395	547
Knowledge management	380	348
Globalization	173	220
Knowledge	167	214
Human capital	144	210
High education	216	206
Intellectual capital	187	197
Education	116	175
University	89	149
Entrepreneurship	79	132
Economic growth	69	114
Competitiveness	55	110
Knowledge society	75	109
Information and communication technology	78	96
Development	56	85
Technology	44	78
Research and development	50	75
Knowledge transfer	61	67
Creativity	46	66

A connection network was created between the main 65 keywords identified in Scopus (Figure 4). Knowledge economy is found in cluster 2 (green) along with competitiveness, digital economy, digital transformation, economic growth, human

resources, information technology, research and development, strategic management, sustainable development. The strongest link strength between knowledge economy and other keywords is presented in Table 5.

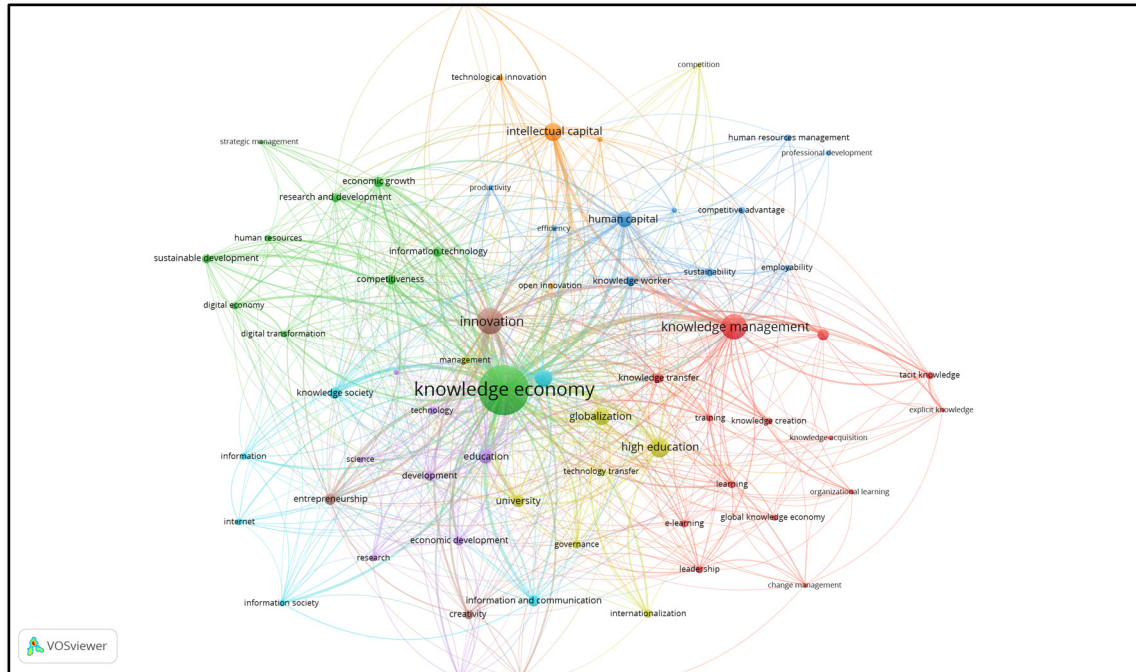


Fig. 4. The most widely used keywords related to knowledge economy (Scopus) – by VOSviewer

Table 5. Main keywords connected with knowledge economy (Scopus)

Keyword	Link strength
Innovation	162
Knowledge management	93
Globalization	79
High education	70
Intellectual capital	53
Human capital	53
Knowledge society	46
Entrepreneurship	40
Education	40
University	37

Innovation is the strongest keyword of cluster 8 (brown) and knowledge management is the strongest keyword of cluster 1 (red).

Conclusion

Drucker, PF. used the term knowledge-based organization for the first time and Machlup, F. introduces the terms knowledge industries and knowledge worker, the pillars on which the

theories about the modern economies are developed.

From this point forward, there were a lot of authors and of regulatory organisms who tried to define and describe the modern economy and the organizations operating within. Especially two terms were used: knowledge-based economy and knowledge economy. Regardless of the term used, generally all the authors agreed on the main

characteristics that a knowledge economy should fulfill: it is based on the human capital, knowledge acquiring, sharing and processing, in order to produce new knowledge and it is innovation oriented.

Knowledge worker represents another concept which was largely studied, a concept closely connected with knowledge economy. Knowledge workers contributed to the development of the knowledge economy and, meanwhile, the knowledge economy supported the expectations of the knowledge workers: access to knowledge, lifetime learning, organizations led by objectives, decision making opportunities. And, step by step, a part of the knowledge workers become what we currently call talents.

In this paper, we analyzed the specialized literature in order to find the most appropriate definitions and characteristics given over time regarding knowledge economy, for a better understanding of this term. Also, by analyzing the specialized literature, we tried to highlight what it was written about, some related topics like knowledge society, knowledge workers, learning economy, knowledge industries, knowledge organization and knowledge occupations.

We can notice that the number of papers reported by Web of Science decreases starting with 2012, with a slow increase in 2019. Scopus reported a continuous increase, the biggest number of papers being reported in 2022 (408 articles), 2019 (419 articles) and 2020 (438). Even if the number of papers reported in Web of Science permanently decreases, the number of papers reported for every year still reflects the interest for this topic. It is worth mentioning that the paper covers only to a small extent the topics found in the specialized literature, given the fact that a search performed on Google Scholar showed that there are more than 20.000 mentions in 2022 alone of the term *knowledge economy*. This indicates that this term is actual and popular.

Regarding the results obtained after performing the bibliometric analysis, we can mention that the results prove the expectations we had after analyzing the specialized literature. The strongest link strength was obtained between knowledge economy and innovation (116 in Web of Science and 162 in Scopus) and knowledge management (67 in Web of Science and 93 in Scopus). Based on

the analyzed literature, we have identified that the knowledge economy is based on high-performance technologies, in a rapid and permanent change, as well as on deep digitalization processes. Those would not be possible without continuous and increasingly sustained innovation. This is why many authors who have approached the topic of knowledge economy have done it together with that of innovation. Also, it can be found that in the modern economy many research projects are carried out by economic entities in partnership with university centers. Therefore, a strong link strength (37) has been identified with the keyword university. Knowledge management contributes to the gathering, organization, analysis and spread of knowledge among the employees of organizations, which makes this process contribute in a defining way to the development of the knowledge economy. Therefore, the existence of a strong strength link between the two topics was expected.

Globalization presents the expected high link strength in Scopus (79), but a lower link strength in Web of Science (38). We consider that this strong link strength is absolutely natural, given the fact that globalization contributes to knowledge sharing, allowing a rapid spread of the results of innovation processes, innovative technologies and the reallocation of talents. Globalization also allows the construction of production facilities closer to the sources of natural resources and/or closer to the distribution markets, which allows organizations to shorten the supply and distribution chains, thus becoming more sustainable. Knowledge economy, as many authors have underlined, is the answer to the increasingly drastic reduction of natural resources, allows for an increasingly rapid and sustainable development of the organizations.

Regarding human capital, we obtain a strong link if we combine the results obtained for human capital and intellectual capital, both from Web of Science and from Scopus. A strong link is obtained also for knowledge by combining the link strength obtained for higher education, knowledge and education (Web of Science) and high education and education (Scopus). In the knowledge economy, human capital is the main asset. Especially intellectual capital, human capital possesses a high level of knowledge and qualifications, obtained both through a high education and through a continuous learning, achieved throughout the entire professional life. The collaboration between organizations and universities in research projects

contributes to the early identification of talents, supporting organizations in building the talent pool.

An unexpected low link strength was obtained for competitiveness: 35 in Web of Science and 31 in Scopus. A possible response to this outcome could be that competitiveness is generally directly related to organizations and not to the knowledge economy. Thus, the knowledge economy leads to radical transformations within organizations, including the increase of competitiveness, which is why, perhaps, the authors have analyzed, in general, the relationship between the knowledge economy and the growth of organizational competitiveness.

Unexpected low levels of link strength were obtained also for information and communication technology: 29 in Web of Science and 37 in Scopus. The explanation could be that these two topics are not directly connected to knowledge economy but by intermediate of other topics connected to knowledge economy. The result is unexpected, given that one of the main pillars on which the knowledge economy is based is information and communication technology. IT&C contributes to the development of an informational structure, allowing easier and more in-depth access to knowledge, its faster spread and a more efficient cooperation between the different structures and locations of the organization. This easier cooperation, along with a more efficient knowledge sharing, contributes to a leverage of innovation. The only explanation for a relatively low level of link strength between knowledge economy and information and communication technology could be the following: being unanimously accepted that knowledge economy is based on information and communication technology, the authors did not feel the need to analyze the relationship between these two topics, this being considered as a certainty and not as a research topic.

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References

- Agenda 2000 (1997) For a stronger and wider Union, Document drawn up on the basis of COM (97) 2000 final 15 July 1997,

- *Bulletin of the European Union, Supplement 5/97*, 1-138.
- Asia-Pacific Economic Cooperation (2000) Towards Knowledge-based Economies in APEC, Report by APEC Economic Committee -November 2000, 1-204.
- Archibugi, D. and Lundval, BA. (2001) The Globalization Learning Economy, Oxford University Press, Oxford.
- Bedianashvili, G., (2018) 'Knowledge Economy, Entrepreneurial Activity and Culture Factor in Modern Conditions of Globalization: Challenges for Georgia', *Globalization and Business*, 5, 32-37.
- Bennet, D. and Bennet, A. (2003) The rise of the knowledge organisation, In: C.W. Holsapple (ed.), *Handbook on Knowledge Management*, 1, Springer, Berlin, Heidelberg, 5-20.
- Bolisani, E. and Bratianu, C. (2018) Emergent Knowledge Strategies. Strategic Thinking in Knowledge Management, Springer International Publishing, Cham.
- Bratianu, C. (2015) Managementul cunostintelor. Concepte fundamentale, Editura Universitara, Bucuresti.
- Bratianu, C. (2019) 'Exploring knowledge entropy in organizations', *Management Dynamics in the Knowledge Economy*, 7(3), 353-366.
- Bratianu, C., Prelipcean, G. and Bejinaru, R. (2020), 'Exploring the latent variables, which support SMEs to become learning organizations', *Management & Marketing. Challenges for the Knowledge Society*, 15(2), 154-171.
- Bratianu, C. and Leon, R. (2015), 'Strategies to enhance intergenerational learning and reducing knowledge loss: an empirical study of universities', *VINE Journal of Information and Knowledge Management Systems*, 45(4), 551-567.
- Bratianu, C., Agapie, A., Orzea, I. and Agoston, S. (2011), 'Intergenerational learning dynamics in universities', *The Electronic Journal of Knowledge Management*, 9(1), 10-18.
- Castells, M. (2010) The Rise of the Network Society, 2nd Edition, John Wiley & Sons Ltd., Chichester.
- Choo, CW. (1996) 'The knowing organization: How organizations use

- information to construct meaning, create knowledge and make decisions', *International Journal of Information Management*, 16(5), 329-340.
- Choo, CW. (2006) The knowing organization: How organizations use information to construct meaning, create knowledge and make decisions, 2nd Edition, Oxford University Press, New York, Oxford.
 - Cristea, D. and Matei, D. (2010), 'Knowledge Society, General Framework for Knowledge Based Economy', *Annals - Economy Series*, 1, 145-156.
 - David, PA. and Foray, D. (2002) An introduction to the economy of the knowledge society, UNESCO 2002, Blackwell Publishers, Oxford, Malden.
 - Draganescu, M. Societatea informațională și a cunoașterii. Vectorii societății cunoașterii, Academia Romana, <https://www.edemocratie.ro/publicatii/Soc%20info%20si%20a%20cunoasterii%20-%20vectorii%20cunoasterii.pdf>
 - Drucker, PF. (1959) The Landmarks of Tomorrow, Harper & Brothers, New York.
 - Drucker, PF. (1969) The Age of Discontinuity. Guidelines to our Changing Society, Hainemann, London.
 - Drucker, PF. (1993a) Post-Capitalist Society, Routledge, Taylor & Francis Group, London and New York.
 - Drucker, PF. (1993b) 'The rise of the knowledge society', *Wilson Quarterly Archives Spring 1993*, 52-71.
 - Drucker, PF. (1999) 'Knowledge-Worker Productivity: The Biggest Challenge', *California Management Review*, 41(2), 79-94.
 - Drucker, PF. (2006) The effective executive. The definitive guide to getting the right things done (published for the first time in 1967), HarperCollins Publishers, New York.
 - El Badawy, TA. (2012) 'Knowledge workers and the creation of an information society in Egypt', *International Journal of Arab Culture, Management and Sustainable Development*, 2(4), 273-291.
 - Gabe, T., Florida, R. and Mellander, C. (2013), 'The Creative Class and the crisis', *Cambridge Journal of Regions, Economy and Society*, 6, 37-53.
 - Giroud, A. and Tucci, CL. (2012), 'Technology, innovation and knowledge: An Asian perspective', *Asian Business & Management (2012)*, 11, 5-7.
 - Graham, M. (2014) The Knowledge Based Economy and Digital Divisions of Labour. *Companion to Development Studies, 3rd edition*, Edited by Vandana Desai and Rob Potter, Routledge, London, 189-195.
 - Grigorescu, A. and Chiper, A. (2016), 'The importance of the human capital in the strategic development of the organization', *Studies of Scientific Researches. Economics Edition, Special issue, June 2016*, 77-82.
 - Grigorescu, A., Pelinescu, E., Ion, AE. and Dutcas, MF. (2021), 'Human Capital in Digital Economy: An Empirical Analysis of Central and Eastern European Countries from the European Union', *Sustainability* 2021, 13, 1-21.
 - Hoffman, O. and Glodeanu, I. (2005), 'Societatea/Economia bazata pe cunoastere', *Revista Română de Sociologie, serie nouă, anul XVI*, 5-6, 427-448.
 - Iancu, S. (2013) 'Societatea Informationala - Societatea Cunoasterii sau Societate Partial Informatizata', *Columna*, 61-75
 - Ichijo, K. and Nonaka, I. (2007) Knowledge Creation and Management: New Challenges for Managers, Oxford University Press, Oxford, New York.
 - Kleinman, DL. and Vallas, SP. (2001), 'Science, capitalism, and the rise of the "knowledge worker": The changing structure of the knowledge production in the United States', *Theory and society*, 30, 451-492.
 - Machlup, F. (1962) The Production and Distribution of Knowledge in the United States, Princeton University Press, Princeton.
 - Machlup, F. (1980) Knowledge - Its Creation, Distribution and Economic Significance, Volume I, Knowledge and Knowledge Production, Princeton University Press, Princeton.
 - Handzic, M. and Zhou, AZ. (2005) Knowledge Management. An integrative approach, Chandos Publishing (Oxford) Limited, Oxford.

-
- Nonaka, I. and Takeuchi, H. (1995) *The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation*, Oxford University Press, Oxford, New York.
 - Organization for Economic Co-operation and Development (1996) *The Knowledge-based Economy*, OCDE/GD(96)102.
 - Rosca, A. (2012) 'Noua paradigmă a dezvoltării economice și societatea bazată pe cunoaștere', *Revista de Știință, Inovare, Cultură și Artă „Akademos”*, 1 (24), 28-31.
 - Rosca, I. G. (2006) *Societatea cunoașterii*, Editura Economica, București.
 - Sabau, G.L. (2001) *Societatea cunoașterii. O perspectivă românească*, Editura Economica, București.
 - Vreja, LO. (2011) 'Conceptul de organizație bazată pe cunoaștere în mediul economic actual', *Școala de cercetare postdoctorală "Economia transferului de cunoaștere în dezvoltarea durabilă și protecția mediului"* (Proiect POSDRU/89/1.5/S/56287), *Academia de Studii Economice, București*.
 - Wiig, KM. (1997) 'Knowledge Management: An Introduction and Perspective', *The Journal of Knowledge Management*, 1(1), 6-14.
 - Williams, BR. (1964) 'Reviewed Work: The Production and Distribution of Knowledge in the United', *The Economic Journal*, 74(293), 174-175.
 - Zack, MH., (2003) 'Rethinking the Knowledge-Based Organization', *MIT Sloan Management Review, Summer 2003*, 44(4), 67-71.