

Digitalization of Economy and Education: Path to Business Leadership and National Security

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Abstract

The article summarizes the areas of research on the integration of digitalization of the economy and education with the areas of business leadership and national security. The main purpose of the study is to determine the contextual characteristics that accompany the development of digitalization of the economy and digitalization of education and their impact on business development and the formation of national security. Existing theoretical and empirical research demonstrates meaningful links between the digitalization of education and the economy, business leadership and national security. The analysis showed that scientific interest in studying the digitalization of education and the economy continues to grow at the present stage, while research on national security and business leadership is currently declining. Bibliometric analysis shows that the relationship between the digitalization of the economy and education with business leadership can be traced in functional areas. On the other hand, the impact of the digitalization of the economy and education on national security can be identified by structural components. One should note that the evolution of scientific research is characterized by the transition from the study of individual structural elements and the penetration of digital technologies into the economy to identify areas for efficiency through digital and information technology. The analysis results provide a scientific basis for further research on key determinants of the effectiveness of the implementation of digital technologies in the economy and education, as well as the study of national security.

Keywords: Digitalization, Economics, Education, Business, Leadership, National Security, Bibliometric Analysis, Information Technology.

JEL Classification: D83, L20, N70, O14, F52.

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Introduction

The development of digital technologies is the cause of many structural and qualitative transformations in the national economy. On the one hand, the digitalization of society is the key to improving the efficiency of many economic processes, simplifying their organization and improving approaches to the implementation of economic relations. On the other hand, the growth of digitalization requires the constant development of staff skills of business structures, increasing the population's digital literacy, increasing the importance of protecting the business from information attacks. That is why the current direction of research is not only the integration of digital technologies and the economy but also determining its digitization. At the same time, the role of digital technologies in education is growing by the emergence of new information-oriented specialties and the integration of digital technologies into educational methods. It determines the need to study the links between the digitalization of the economy and education with the resulting indicators of the country's development at the macro and micro levels.

Literature Review

The development of scientific literature on the study of digital technologies begins in the twentieth century in connection with the formation of new sectors of the economy associated with the development of the information society. At the same time, the latest approaches to digitalization cause a growing interest in the most advanced technologies and their integration into all sectors of the economy and society. Thus, in particular, the globalization of economic relations has led to the active development of online commerce, accompanied by continuous improvement of technical support for its implementation (Bacik et al., 2020;

Kostikov et al., 2021), as well as ways to attract customers (Giebe et al., 2019; Elsayed, 2021; Zhghenti & Chkareuli, 2021). At the same time, a significant impact of informatization and digital technologies is observed for a real business, which changes the structure of its competitive advantages (Delanoy & Kasztelnik, 2020; Kaya, 2021). At the same time, it opens up prospects for redistribution of market positions and change of business leaders (Parviainen et al., 2017). The significant impact of digitalization is reflected in the transformation of methods and tools used in education (Lopez et al., 2020; Ugur, 2020; Matos & Kasztelnik, 2021; Pettersson, 2021). Much attention is also paid to the study of information technology in public life and the social effect they cause (Bardy & Rubens, 2019). On the other hand, today, digitalization is penetrating even the public administration system and has a significant role at the global level (Lopez & Alcaide, 2020). Accordingly, the penetration of information technology leads to an increasing function of information and cybersecurity in ensuring national security (Obeid et al., 2020; Yarovenko et al., 2020).

Methodology and Results

The study of current trends in economics and economics has shown a growing interest in studying the development of digital technologies, their impact on the economy, education, national interests, and economic entities' activities in recent years. At the same time, it is important to explore the periods of formation of scientific and research interest to determine the stage of the study of this topic. For this purpose, the Google Books Ngram Viewer toolkit was used, which allows systematizing the frequency of occurrence of the studied concepts in the scientific literature. Thus, Fig. 1 presents the results obtained for the query “digital economy”, “digital education”. It is important that in scientific books, such concepts as “digitalization of economy” and “digitalization of education” are almost nonexistent. The data of fig. 1 show that the scientific interest in the study of the digital economy has been formed since the mid-1990s; it is characterized by the achievement of the first peak in the early 2000s and a rapid scientific interest since 2015. On the other hand, the penetration of digital technologies into the education system was first mentioned in scientific books in the mid-1990s. However, it became the object of actively growing scientific interest much later – only in 2010.

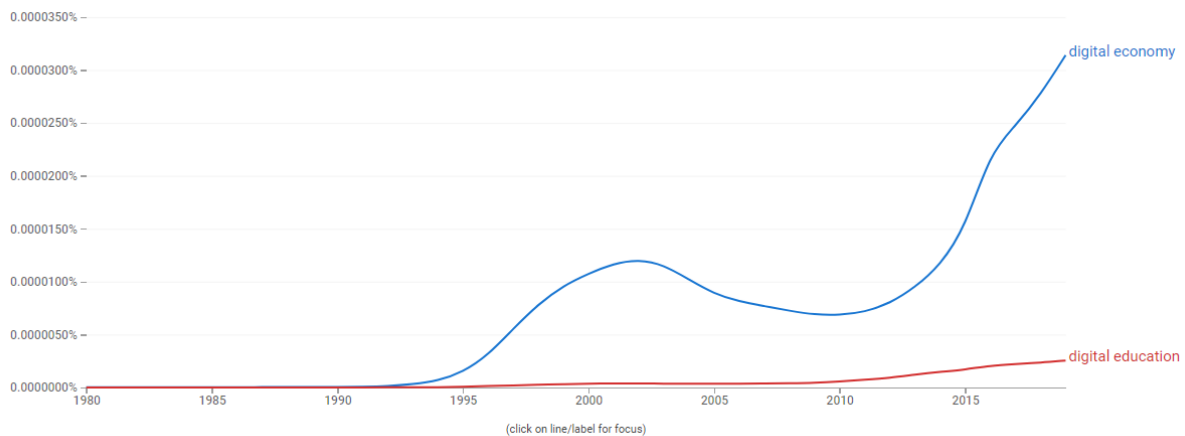


Figure 1. Results of Google Books Ngram Viewer Analysis on the Scientific Interest to “Digital Economy”, “Digital Education” for 1980-2019

Source: Google Books Ngram Viewer, 2021

At the same time, the analysis of scientific books that study the issues of “business leadership”, “national security” shows significant differences in the formation of scientific interest in the study of these categories (Fig. 2). Thus, in particular, the first mention of the concept of “business leadership” begins in 1900 (Fig. 2.a), accompanied by the steady increase in the scientists' attention, which is maximized in 1950-1960, after which there is a decline in the frequency of this concept, lasted until the early 2000s. Today is characterized by a new wave of intensification of scientific interest in this category, which does not reach its historical maximum.

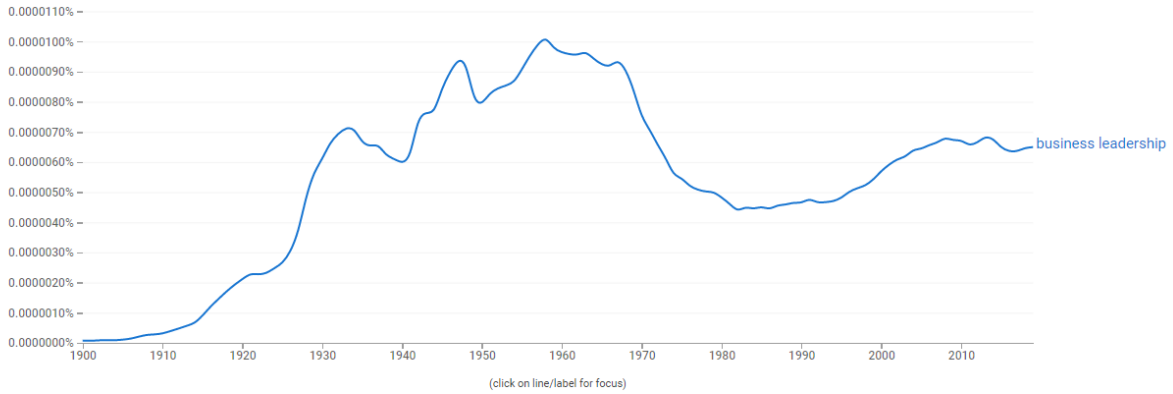


Fig. 2.a. Results of Google Books Ngram Viewer Analysis on the Scientific Interest to “Business Leadership” for 1900–2019
Source: Google Books Ngram Viewer, 2021

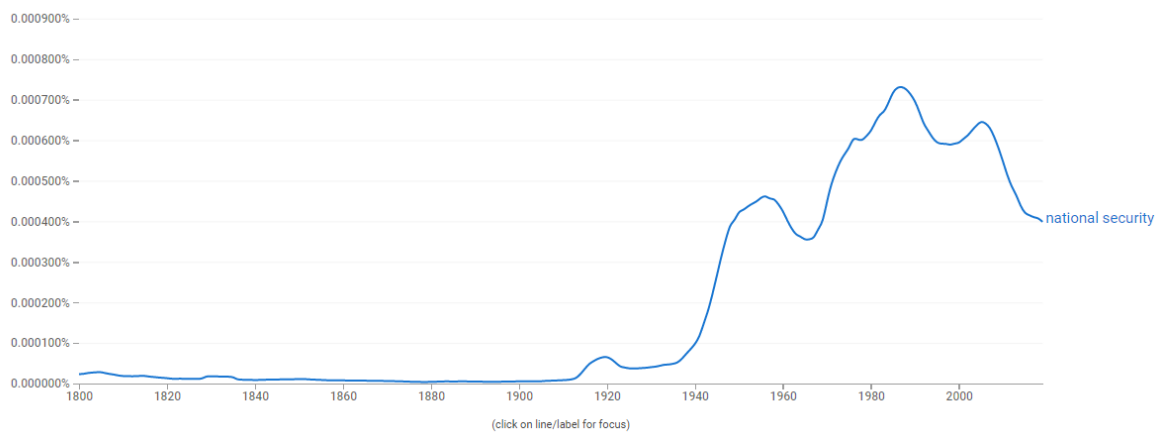


Fig. 2.b. Results of Google Books Ngram Viewer Analysis on the Scientific Interest to “National Security” for 1800–2019
Source: Google Books Ngram Viewer, 2021

Figure 2. Results of Google Books Ngram Viewer Analysis on the Scientific Interest to “Business Leadership”, “National Security”

On the other hand, national security issues have appeared in scientific books since the early 1800s (Fig. 2. b), which presupposed the military-defense context of the study. At the same time, the issue has been studied on a large scale since the 1910s, which was characterized by waves of scientific interest. The last most significant of it was characterized by the period of 2010. Thus, it can be stated that the digitalization of the economy and education is an object of scientific interest rather than the consequences of the development of these issues related to business and national security. At the same time, the context of the study of the concepts of digitalization of the economy and digitalization of education is interesting and the existence of common areas of scientific interest with the study of the concepts of business leadership and national security. So, researching this issue, we use the tools of biometric analysis VOSviewer.

A sample of 175 articles indexed by the Scopus scientometric database was formed to analyze the context of the study. It simultaneously contains such keywords as “digitalization” (or “digital”), “economy” and “business leadership” (or “business leader”). These words can appear in the titles of articles, their abstracts, or in the list of keywords. At the next stage, the coincidence of the general list of keywords in the selected articles was analyzed, which allowed forming clusters of the most common keywords (Fig. 3).

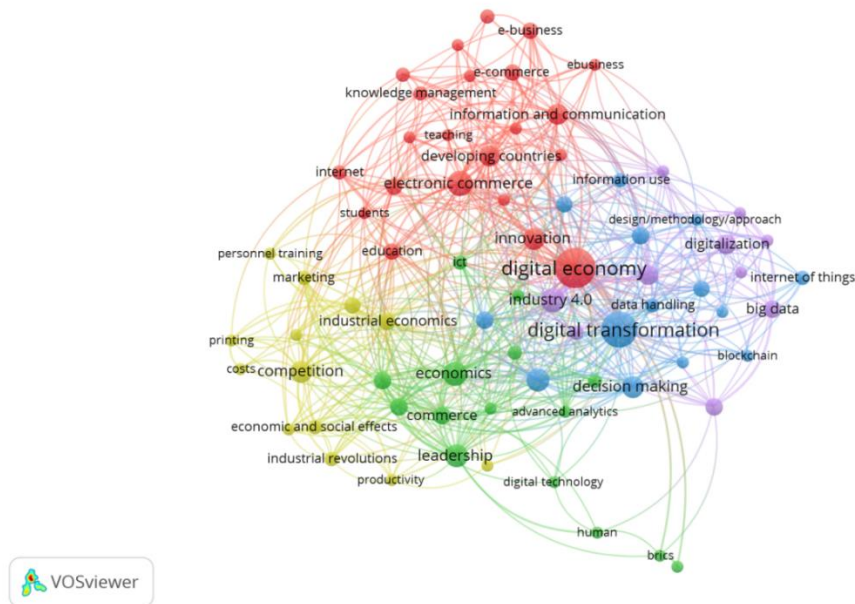


Figure 3. Results of Bibliometric Analysis of Keywords Co-Occurrence on the Request “Digitalization”, “Economy” and “Business Leadership”

Source: VOSviewer, 2021

According to the analysis, five clusters of keywords combine certain research contexts that study the issues of digitalization of the economy and business leadership. Thus, the largest of the identified clusters (red cluster) combines 22 keywords, including “digital economy”, “e-commerce”, “knowledge economy”, “e-learning”, “e-readiness”, “innovation”. They generally mediate the context of the interaction of economics, education and information technology. In second place in size is the green cluster, which includes such concepts as “e-leadership”, “strategic planning”, “investments”, “global governance”, which generally combines the management context of the use of digitalization to achieve leadership positions. The blue cluster includes 14 keywords, including “decision making”, “information management”, “sustainable development”, “data handling”, which summarize the applied aspects of the use of information technology in business and economics and achieve certain goals with their application. On the other hand, the yellow cluster, which contains 13 keywords, covers such concepts as “competition”, “marketing”, “personnel”, “productivity”, “international trade”, “business models”, which summarizes the structural and functional aspects of management business in the context of digitalization. The smallest of the identified clusters (purple) contains such concepts as “industry 4.0”, “human engineering”, “artificial intelligence”, which allows to generalize it as the direction of today's most promising achievements of the digital economy.

It is important that evolutionary research has evolved, starting the study of the knowledge economy and the interaction of digital technologies, education and business (Fig. 4). At the same time, the most modern scientific works are focused on the study of digital transformations and technological advances. In the next stage of the study, we will analyze the contextual relationships that arise between the concepts of “digitalization”, “education”, and “business leadership”. To do this, we use a similar research methodology, selecting articles that simultaneously contain such references as “digitalization” (or “digital”), “education”, and “business leadership” (or “business leader”). Bibliometric analysis of 119 articles presented by the scientometric database Scopus allowed to identify five clusters that mediate research areas on the subject (Fig. 5). Thus, the two largest clusters (red and green) include 11 keywords each. The red cluster includes such keywords as “digital transformation”, “engineering education”, “information management”, “decision making”, “data handling”, which allows defining this scientific direction as information management.

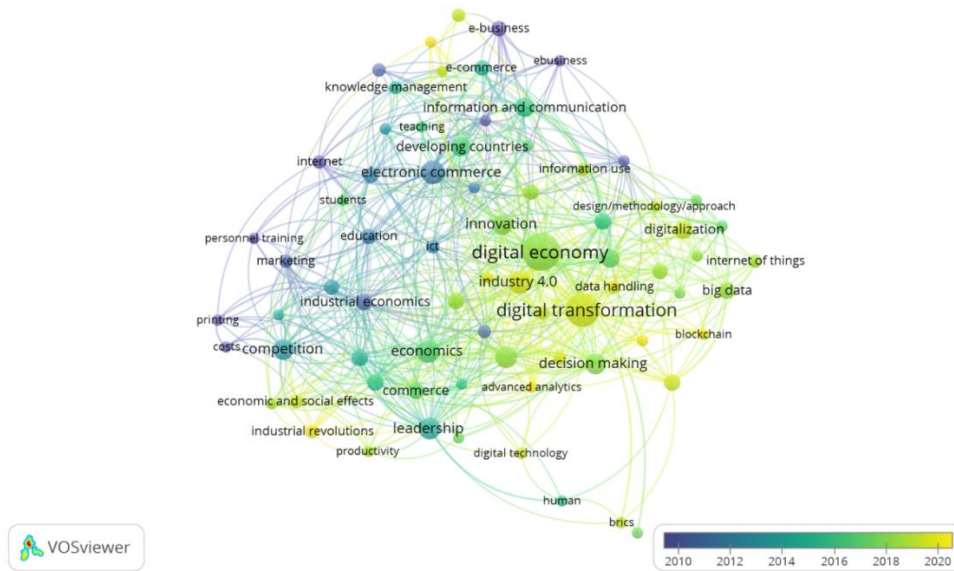


Figure 4. Results of the Bibliometric Analysis of the Chronological Development of the Researches in “Digitalization”, “Economy” and “Business Leadership”

Source: VOSviewer, 2021

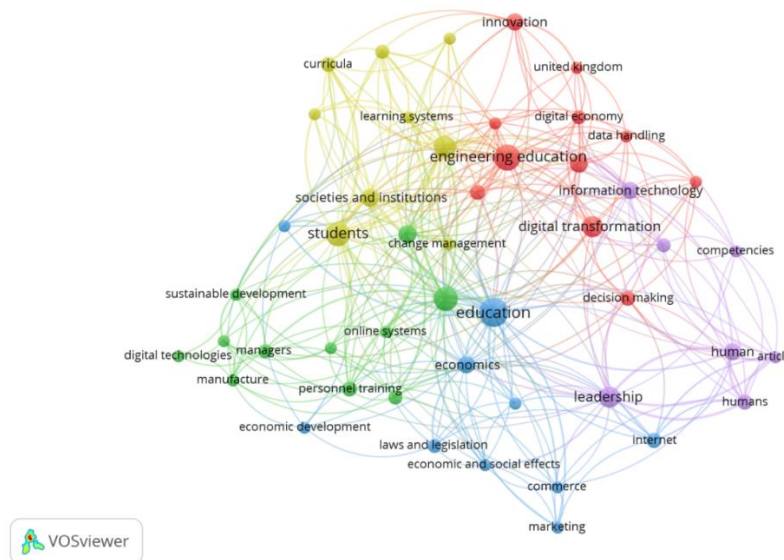


Figure 5. Results of Bibliometric Analysis of Keywords Co-Occurrence on the Request “Digitalization”, “Education” and “Business Leadership”

Source: VOSviewer, 2021

On the other hand, the green cluster contains such key words as “business leaders”, “personnel training”, “human resource management”, “e-learning”, which reflects the use of information technologies in management and personnel training. The next largest cluster is blue. It contains such key words as “commerce”, “economic development”, “laws and legislation”, “education computing” and mediates the economic component of the implementation of digital technologies in the education system and business. The yellow cluster includes only 9 keywords, including “change management”, “knowledge management”, “project management”, “societies and institutions”, which allows to classify it as representing the management context and institutional environment of digital technology dissemination. The last cluster (purple) consists of 7 words, among which the most important are “leadership”, “human”, “artificial intelligence”. Thus, this cluster can be attributed to the prospects for the development of information technology. Analyzing the evolution of scientific research in this area (Fig. 6), we note that earlier works were devoted to the institutional environment of digital technology, its interaction with the economy and society, while the most modern work mainly deals with applied aspects and research of advanced information technologies.

The largest red cluster, consists of 18 keywords, in particular, such as “education”, “employment”, “human”, “medical education”, “information system”. It generalizes the context of digital education and dissemination of information technology in society. The green cluster contains 15 key words, such as “computer science”, “e-learning”, “education computing”, “engineering education”, “multimedia systems”, “security of data”, which summarizes the direction of computer science. The blue cluster includes such keywords as “cryptography”, “cyber security”, “network security”, “personal computing”, which summarizes information and cybersecurity both at the general and personal level. The key words that formed the yellow cluster are “artificial intelligence”, “digital literacy”, “information management”, “web services”, which generally characterizes the level of penetration of digital technologies into society. The last (purple) cluster contains such categories as “critical infrastructures”, “decision-making”, “security systems”, “societies and institutions”, which indicates the infrastructural provision of national information security. At the same time, the analysis of the evolution of the development of scientific thought on the digitalization of education and national security, the results of which are presented in Fig. 10.

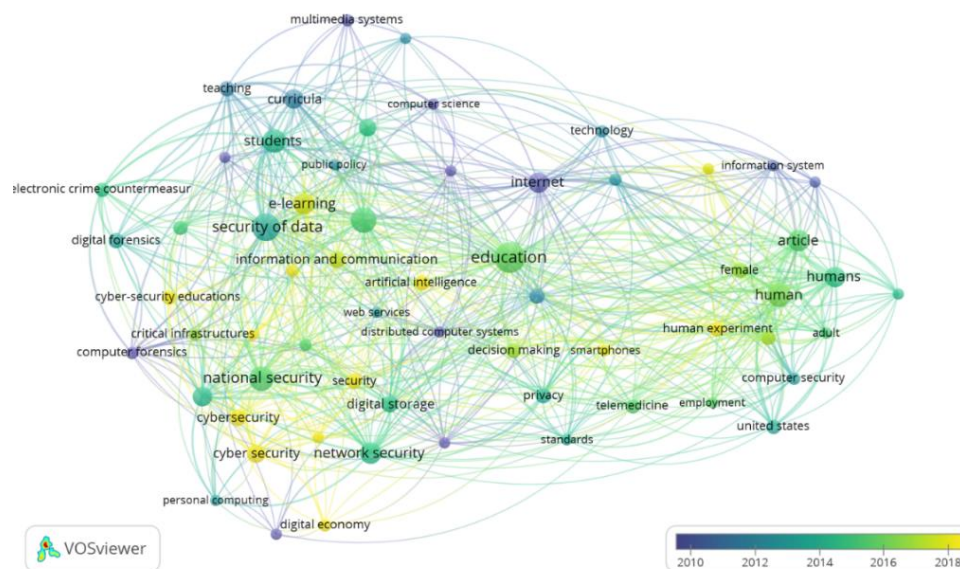


Figure 10. Results of Bibliometric Analysis of the Chronological Development of the Research in “Digitalization”, “Education” and “National Security”

Source: VOSviewer, 2021

The study found that the earliest publications related to computer science and the development of information systems. Recent research in this area focuses on cybersecurity, artificial intelligence and the digital economy.

Conclusions, Discussion and Recommendations

The study aims to identify meaningful links between the digitalization of education and the economy, business leadership and national security. The analysis showed that scientific interest in the study of the digitalization of education and the economy continues to grow at the present stage, while research on national security and business leadership is currently declining. Bibliometric analysis shows that the connection between the digitalization of the economy and the digitalization of education with business leadership can be traced in functional areas. On the other hand, the impact of the digitalization of the economy and education on national security can be identified by structural components. It should be noted that the evolution of scientific research is characterized by the transition from the study of individual structural elements and the penetration of digital technologies into the economy to identify areas for efficiency through digital and information technology.

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