The Impact of Alphabet Inc.'S (Google) Services on the Advancement of Knowledge, Innovation and the Harnessing of Intellectual Capital in the Knowledge-Based Economy

Dorinela Nancu
Ana-Maria Barzecu
"Ovidius" University of Constanta, Faculty of Economic Sciences, Romania
cusudorinela@yahoo.com
ana_barzecu@yahoo.com

Abstract

We have chosen this theme because the knowledge-based economy is already the present, and the ICT sector is the optimal infrastructure for its development, so that knowledge, creativity and innovation, as well as intellectual capital, are accessible to all. In this context, we considered it necessary to analyze the extent to which individuals have been concerned to develop their knowledge, skills and creativity with the services of Alphabet Inc. (Google).

Key words: knowledge-based economy, intellectual capital, innovation, knowledge, Google
J.E.L. classification: O3

1. Introduction

This paper is a research study that encompasses theoretical and practical notions about the knowledge-based economy in the context of Internet and communications development, based on the contributions of the most representative company in the field of Internet browsing, namely Alphabet Inc.

In the first part of the paper we consulted the literature on the knowledge-based economy, with a strong focus on the changes brought about by ICT perspectives. In the second part of the paper we developed a questionnaire to analyze the extent to which Google services contribute to the advancement of knowledge, innovation and the valorization of intellectual capital, respectively to the knowledge-based economy, from the perspective of Google service users.

2. Literature review

2.1 General aspects of the knowledge-based economy

The knowledge-based economy is a modern term describing an economy in which the production, distribution and use of knowledge plays the leading role. In such economies, intellectual capital and creativity become the main resources, overtaking traditional resources such as natural capital or manual labor. As defined by the OECD, a knowledge-based economy is an economy based directly on the production, distribution and use of knowledge and information.

Historically, the origin of the concept of knowledge-based economics can be traced back to the work of classical economists such as Adam Smith and Karl Marx, who recognized the importance of knowledge and human capital. However, the term began to gain popularity in the 1960s and 1970s as economists began to observe structural changes in advanced economies.

A turning point was the work of Peter Drucker (1969, pp. 34-39.), where he introduced the concept of the knowledge society. Drucker emphasized the importance of knowledge as an economic resource and anticipated the transition from traditional industrial to knowledge-based economies.

In the 1990s, with the expansion of the internet and digital technologies, the concept received increased attention. Daniel Bell (1973, pp. 71-72.), described the shift towards a post-industrial society where services and knowledge become more important than industrial production.

The development of the knowledge-based economy has been accelerated by globalization and technological progress. This has led to significant growth in the service sector, particularly in IT, finance, education and health.

A key element in the development of knowledge-based economies has been investment in education and research. Countries that have invested heavily in human capital training and research and development (R&D) have experienced significant increases in innovation and economic competitiveness.

The knowledge-based economy is therefore the foundation for economic and social development in the 21st century. It implies a shift from traditional resources to knowledge, innovation and technology, emphasizing the importance of education and research, but nevertheless the knowledge-based economy while offering huge opportunities also brings challenges, requiring continuous adaptation from both individuals and societies.

2.2 Human capital in the knowledge-based economy

Human capital, at its essence, is an aggregate of competencies, knowledge, skills and experiences developed by individuals that can be mobilized to generate economic value. In the knowledge-based economy, this concept takes on a new dimension, becoming a decisive factor in determining competitiveness and economic success.

Becker (1964, pp. 39-42.), in his pioneering work on human capital, emphasized that education and training are essential investments that bring benefits both at the individual level - through increased income and career opportunities - and at the macroeconomic level, by stimulating economic growth. This perspective has been supported and extended by subsequent economists, who have shown that investment in human capital can lead to productivity growth, innovation and economic development.

In addition, human capital in the knowledge-based economy is characterized by skills and competences that transcend traditional technical knowledge. Critical thinking skills, creativity, adaptability and digital competences are increasingly valued. This is in line with the observations made by knowledge-based economy theorists such as Drucker (1993), who argued that knowledge workers, i.e. those who apply theory and knowledge to practical problems, are the most important resource of these economies (Drucker, 1993, pp. 101-105.).

In the information and technology age, the labor market is facing increased demand for complex analytical, creative and critical thinking skills. According to studies, such as the one by Levy and Murnane (David et. all pp. 1279-1333), there is a polarization in the labour market, with an increasing demand for high and low-skilled jobs, while middle-skilled jobs are being automated or outsourced.

2.3 Key sectors in the knowledge-based economy

The knowledge-based economy, characterized by an increasing dependence on information, technology and innovation, has redefined the global economic structure. This economy relies on key sectors that are the engines of growth and development.

Information and Communication Technology. ICT is an area characterized by constant innovation. With the emergence of emerging technologies such as cloud computing, Internet of Things (IoT), artificial intelligence (AI) and big data, the ICT sector has become a key driver of innovation in the global economy. These technologies not only improve existing products and services, but also open up new markets and opportunities.

Biotechnology and pharmaceuticals are key segments of the knowledge-based economy, with a significant impact on public health and technological innovation. At the core of the biotechnology and pharmaceutical industry is research and development (R&D). The development of new drugs and vaccines has contributed significantly to fighting diseases and increasing life expectancy. For example, in the context of the COVID-19 pandemic, the speed with which vaccines have been

developed demonstrates the tremendous capacity of these sectors to respond to global health challenges.

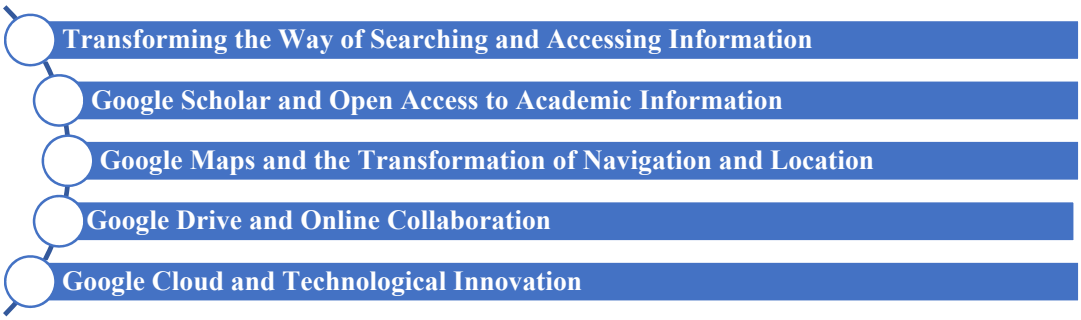
Financial services and consultancy are also part of the knowledge-based economy, playing an important role in facilitating innovation and growth. The financial services sector has been profoundly transformed by digitalization and technological innovation. Phenomena such as fintech (financial technology), blockchain and digital currencies have revolutionized the way financial transactions and services are conducted and perceived. These innovations bring increased efficiency, transparency and accessibility, but also present new challenges in terms of cybersecurity and regulation.

Education and research are also of great importance in the knowledge-based economy, playing a fundamental role in building human capital and promoting innovation. These sectors provide the skilled workforce needed for other areas of the knowledge-based economy and are also the main source of the research and development (R&D) that fuels innovation in all sectors. In the knowledge-based economy, education is transforming to meet the needs of a rapidly changing world. The focus is shifting from rote learning to developing critical, creative and analytical skills. Continuing education and vocational training ensure the adaptability of the workforce in the face of technological progress and changes in the labor market.

The creative industries and media are a dynamic and influential segment of the knowledge-based economy. This section details how these fields contribute to innovation, economic and cultural development, and reflects the intersection between creativity, technology and the economy.

2.4 Google's contribution to the knowledge-based economy

Figure no. 1 Google's contribution to the knowledge-based economy



Source: own adaptation

According to Figure 1, Google's main contributions to the knowledge-based economy at a global level are the following:

Transforming how we Search and Access Information

Google's fundamental service, its search engine, has redefined the way people access information. Through advanced algorithms and an intuitive interface, Google Search has provided a fast and efficient way to find answers to a variety of questions. This ability to search for information instantly changed the search paradigm, accelerating decision-making processes and stimulating rapid knowledge transfer.

Google Scholar and Open Access to Academic Information

Google Scholar, a platform launched in 2004, has had a significant impact on the way researchers and academics access scientific literature. By indexing and providing access to a wide range of scholarly works, Google Scholar has facilitated the sharing of scholarly knowledge and contributed to the democratization of scholarly information. This aspect of Google's services has helped to accelerate the pace of progress in scientific research and to create a digital infrastructure for global knowledge sharing.

Google Maps and the Navigation and Location Transformation

Launched in 2005, Google Maps has redefined the way we navigate and interact with physical space. By providing interactive maps, traffic information and navigation directions, Google Maps has facilitated mobility and improved route planning. This technology has not only changed the way

people get around, but has also stimulated innovation in areas such as commerce, local advertising and tourism, contributing to the evolution of the knowledge-based economy.

Google Drive and Online Collaboration

Google Drive, an online storage and collaboration platform launched in 2012, has had a significant impact on the way documents and data are managed and shared in the digital environment. By providing storage accessible from anywhere, at any time, Google Drive has made it easier to collaborate globally. This has led to increased efficiency in virtual work environments and fostered remote collaboration, essential in the knowledge-based economy.

Google Cloud and Technology Innovation

Google Cloud, launched in 2011, has impacted digital infrastructure and the way organizations access and use cloud services. By offering services such as storage, data analytics and artificial intelligence, Google Cloud has opened new horizons for technological innovation and product development. Businesses and start-ups have benefited from Google Cloud's ability to offer scalable computing and storage resources, spurring innovation in areas such as medical technology, fintech and artificial intelligence.

Through its services, Google has contributed to the development of a knowledge-based economy through a number of mechanisms. First, providing easy access to information has stimulated individuals and organizations to increase their capacity to learn and adapt. The efficient search for knowledge has become an engine for innovation and progress.

Second, Google's services have created a digital infrastructure essential for businesses and institutions to operate in a global environment. From online collaboration to secure data storage, these services have been fundamental to the development of the digital environment.

3. Research methodology

From a methodological point of view, the questionnaire is a quantitative research that involves collecting numerical data from a sample and analyzing it statistically in order to draw conclusions about the situation in question. In this direction, we developed a questionnaire to analyze the extent to which Google services contribute to the advancement of knowledge, innovation and the valorization of intellectual capital, i.e. the knowledge-based economy, from the perspective of Google services users.

The investigated sample is made up of individuals present in the online environment, on social networking groups. The sampling technique is represented by random sampling, dividing a digital questionnaire among social networking groups.

The aim of the research was to determine the extent to which Google services contribute to the advancement of knowledge, innovation and the valorization of intellectual capital, i.e. the knowledge-based economy, from the perspective of Google service users.

The research objectives are:

1. Determining the level of awareness and frequency of use of Google services.
2. Analyzing users' perceptions of their contribution to the advancement of knowledge, innovation and the valorization of intellectual capital, i.e. to the knowledge-based economy

The research hypotheses are:

1. Frequent users of Google services have a positive perception of their impact in promoting knowledge and innovation compared to occasional users.
2. Users who use Google's services to access information find that they have a significant impact on their cognitive development, particularly in terms of accumulating and understanding new knowledge.

4. Findings

The questionnaire was completed by 100 people and had a total of 10 questions, representing a total of 1000 responses. In order to fulfill the purpose of the questionnaire, i.e.: Determining the extent to which Google services contribute to the advancement of knowledge, innovation and the valorization of intellectual capital, i.e. the knowledge-based economy, from the perspective of

Google service users, we have aggregated the responses to present an overview of the results obtained.

Table no. 1 Centralization of data on question 1 of the questionnaire

Question 1: How long have you been using Google services?	
Response options	**Number of respondents**
I have been using Google services for many years	100
I have been using Google services for some time	0
I started using Google services recently	0

Source: own processing

This question is intended to segment respondents according to their experience of using Google services, providing insight into how they have evolved over time. Therefore, when asked how long have you been using Google services, 100.0% of respondents said that they have been using Google services for many years.

Table no. 2 Centralization of data on question 2 of the questionnaire

Question 2: How often do you use Google services?	
Response options	**Number of respondents**
I use them every day	100
I use them a few times a week as needed	0
I use them rarely or not at all	0

Source: own processing

This question provides information about their engagement and ongoing use of Google services, which may influence their perception of the impact of these services. Therefore, for the question: How frequently do you use Google services, 100.0% of the respondents use Google services daily.

Table no. 3 Centralization of data on question 3 of the questionnaire

Question 3: What services do you generally use?	
Response options	**Number of respondents**
I use the search engine, but other services: drive, cloud, education services	79
I use the search engine and basic services like email or drive	14
I mostly just use the search engine	7

Source: own processing

This question provides insight into the diversity of Google services used, with a focus on those that can have a significant impact on knowledge and innovation.

Therefore, to the question: which services do you use in general, 79.0% answered that they use the search engine, but also other services: drive, cloud, education services, 14.0% answered that they use the search engine and basic services such as email or drive and 7.0% mostly use the search engine only.

Table no. 4 Centralization of data on question 4 of the questionnaire

Question 4: How frequently do you use Google services to develop your personal skills, knowledge and competences?	
Response options	**Number of respondents**
Very common	75
From time to time	25
Quite rare	0

Source: own processing

This question focuses directly on the impact of Google services on the respondent's personal and professional development.

Therefore, to the question: how frequently do you use Google services for the development of personal skills, knowledge and competences, 75.0% of the respondents state that they use Google services very frequently for the development of personal skills, knowledge and competences and 25.0% use Google services occasionally for personal development.

Table no. 5 Centralization of data on question 5 of the questionnaire

Question 5: How do you think Google's services contribute to the knowledge society?	
Response options	**Number of respondents**
Google is an important driver in promoting knowledge and education	100
Partial contribution	0
I don't think Google contributes significantly to the development of knowledge	0

Source: own processing

This question explores respondents' general perception of Google's role in promoting knowledge and education.

Therefore, when asked: How do you think Google's services contribute to the development of society in terms of knowledge, 100.0% chose the option: Google is an important driver in promoting knowledge and education.

Table no. 6 Centralization of data on question 6 of the questionnaire

Question 6: Do you think Google stimulates innovation and creativity in society?	
Response options	**Number of respondents**
Yes, Google is a key factor in driving innovation and creativity	82
Partial contribution	18
I don't think Google helps to stimulate innovation and creativity	0

Source: own processing

This question aims to assess the general perception of Google's role in stimulating innovation and creativity.

Therefore, to the question: Do you think that Google stimulates innovation and creativity in society, 82 out of 82.0% of the respondents chose the option: Yes, Google is a key factor in stimulating innovation and creativity, representing the favorable variant, 18 of the respondents, i.e.

18.0% chose the variant: It partially contributes, representing the neutral variant and 0 respondents, respectively 0.0% chose the variant: I do not think that Google helps to stimulate innovation and creativity, unfavorable.

Table no. 7 Centralization of data on question 7 of the questionnaire

Question 7: Do you feel that using Google services has improved your personal skills and competences?	
Response options	**Number of respondents**
Yes, using the services has helped me develop valuable skills and competences.	80
Partially helped me	20
No, I don't think it had a significant impact on my personal skills.	0

Source: own processing

This question explores the direct impact of Google services on the development of the respondent's personal skills and competences.

Therefore, when asked: Do you feel that using Google services has improved your personal skills and competences? 80.0% answered in the affirmative and 20.0% consider that Google services have partially helped them.

Table no. 8 Centralization of data on question 8 of the questionnaire

Question 8: Do you feel that using Google services has improved your creativity?	
Response options	**Number of respondents**
From	78
Partially	22
No	0

Source: own processing

This question examines whether the respondent believes that Google has a positive impact on stimulating their creativity.

Therefore, to the question: do you feel that using Google's services has improved your creativity 78,0% answered yes and 22,0% of the respondents say that Google's services partially improve creativity.

Table no. 9 Centralization of data on question 9 of the questionnaire

Question 9: How easy do you find it to adapt to the new features and services introduced by Google?	
Response options	**Number of respondents**
Easy enough	83
Partly easy	17
I find it difficult to adapt	0

Source: own processing

This question measures the respondent's level of comfort and adaptability to Google's changes and innovations.

Therefore, to the question: how easily do you think you adapt to the new features and services introduced by Google, 83.0% of respondents answered that they adapt quite easily and 17% partially easily.

Table no. 10 Centralization of data on question 10 of the questionnaire

Question 10: To what extent do you think Google services contribute to the global knowledge-based economy?	
Response options	**Number of respondents**
Contribute significantly	100
Partial contribution	0
Insignificant contribution	0

Source: own processing

This question examines the respondent's overall perception of the contribution of Google services to the global knowledge-based economy worldwide.

Therefore, to the question: To what extent do you think Google's services contribute to the global knowledge-based economy, 100.0% of respondents answered yes.

In this context, the majority of respondents use a wide range of Google services, including Google services to develop their personal skills, knowledge and competencies, and the majority of respondents agree that Google services have helped them to develop their skills and knowledge, as well as their creativity and capacity to innovate. The majority of respondents believe that they have a strong overall impact on the global knowledge-based economy.

5. Conclusions

The knowledge-based economy is a system of consumption and production based on intellectual capital, referring to the ability to capitalize on scientific discoveries and applied research. In a knowledge-based economy, a significant component of value may consist of intangible assets, such as the value of workers' knowledge or intellectual property.

Human capital, at its essence, is an aggregate of competencies, knowledge, skills and experiences developed by individuals that can be mobilized to generate economic value. In the knowledge-based economy, this concept takes on a new dimension, becoming a decisive factor in determining competitiveness and economic success.

In terms of its own contribution to this theme, the research aimed to determine the extent to which Google services contribute to the advancement of knowledge, innovation and the valorization of intellectual capital, i.e. the knowledge-based economy, from the perspective of Google's users.

Following the survey of 100 respondents, it was concluded that the majority of respondents use a wide range of Google services, including Google services for the development of personal skills, knowledge and competences, and the majority of respondents agree that Google services have helped them to develop their skills and knowledge, as well as their creativity and capacity for innovation. The majority of respondents believe that they have a strong overall impact on the global knowledge-based economy.

6. References

- Becker, G. S., 1964. *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education*. New York: Columbia University Press.
- Bell, D., 1973. *The Coming of Post - Industrial Society. A Venture in Social Forecasting*. New York: Basic Books.
- D. H., Levy, F., & Murnane, R. J., 2003. The Skill Content of Recent Technological Change: An Empirical Exploration. *The Quarterly Journal of Economics*, 118(4), pp. 1279-1333. https://doi.org/10.1162/003355303322552801
- Drucker, Peter, 1969. *Age of Discontinuity,* 1st Edition. Manhattan: Harper&Row. https://doi.org/10.1016/B978-0-434-90395-5.50005-5
- Drucker, P. F., 1993. *Post-Capitalist Society*. New York: Harper Business.