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The EU's Contribution on the Knowledge Economy: Balancing Policy Engagement and Global Competition

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Abstract:

This article aims to study the role of the knowledge economy and the hegemonic power of modern states, focusing on the European Union. In the recent past, academic literature in the international relations emphasized military force as dominant theories of strength and power. However, in today's globalized world, knowledge along with technical and technological advancements has become an essential lever for this hegemonic power. First, this work addresses the subject of the knowledge economy, its definitions, its historical trajectory, and theoretical models of this model. Secondly, it diagnoses the situation in the European Union through the various public policies adopted in the field of scientific research and the innovation ecosystem in Europe. Lastly, this scientific work tries to establish a link between hegemonic power and whether the European Union can be considered a hegemonic power like other actors on the international stage, such as the United States and China.

Keywords: European Union; Knowledge Economy; Hegemonic power; Innovation; Competition.

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1. INTRODUCTION

Reading an article published on April 15, 2025, in the esteemed British newspaper, The Financial Times, titled "Top Donald Trump Official Asks Europe to Choose Between US or Chinese Communications Technology," increased my intellectual curiosity regarding the structure of the global economic and political framework, in which knowledge and communication serve as capital and wealth that ensure global economic security. This intangible capital has become crucial for all states to secure a solid position and sustain hegemony in international affairs. Consequently, following a comprehensive examination of this article, it prompted a passage by the British political scientist Susan Strange, who asserts that technology serves as the tangible means to attain ideological objectives. This illustrates the strategic and essential role of technology invention and mastery, as well as the resultant proliferation of information, in enhancing a state's influence on the international stage. Furthermore, experts in international political economy discuss what they refer to as the seven indices of modern state power.

Consequently, in a dynamic and uncertain global landscape, Europe, the origin of the Renaissance and the Industrial Revolution, is currently confronting an intensification of competition between two technological and knowledge production superpowers: the United States and China. Each actor is trying to establish control over high-tech production and the advancement of technological capabilities to enhance the hegemonic influence of both parties. The "Financial Times" article illustrates Europe's deficiency in knowledge generation and highlights issues associated with emerging technologies, including open resources and artificial intelligence. Additionally, a summit was convened in Paris, France, on February 10-11, 2025, to address the problems of AI policy and to evaluate the progress made by European leaders in overcoming the technological and knowledge gap with the two global leaders.

Research question:

To what extent did the adoption of the knowledge economy enable the European Union to position itself as a hegemonic power in the international system, and is this sufficient to compete with other global powers such as the United States and China?

Hypotheses:

• The knowledge dimension represents a new component of hegemonic power, redefining the classical understanding traditionally based on military power.

• Although the European Union possesses significant institutional, scientific, and budgetary assets, these have not enabled it to emerge as a hegemonic power.
• Becoming a hegemonic power requires the European Union to move beyond knowledge alone and adopt a balanced strategy combining internal coherence with effective international influence.

2. The evolution of the knowledge economy and its focus.

2.1 Definitions & conceptual framework:

To properly define our research theme, it is essential to follow a simple and well-defined methodology, starting the research for its first part, defining the concepts and establishing the appropriate terminology to fully understand the study and its results. The terms "knowledge-based economic model" and "knowledge economy" referred to the same concept: the advancement of a discipline focused on the study of knowledge.

Below are the contributions of Austrian economist **Fritz Machlup** in his book "The Production and Distribution of Knowledge in the United States" Published in 1962[1] this book explores knowledge and its significance in production activities, along with several classifications of knowledge types and their contributions to national production.

The philosopher and economist **Karl Polanyi**, however, without explicitly articulating it, points out the value of knowledge in his works, especially in The Great Transformation. Furthermore, the author posits that knowledge may be seen as a fake commodity, transcending the essential components of society identified by Polanyi: land, labour, and money[2].

From a complementary perspective, the British political scientist **Susan Strange** conducted other works in her 1987 book "States and Markets: An Introduction to International Political Economy[3], where she aimed to establish a structure and identify four essential components of power in the international political economy, one of which is the knowledge structure.

Following the transition into a globalised era marked by the dissolution of the Soviet bloc and the subsequent evolution of the international economic and political order, in addition to advancements in communication and information technologies, there is an important shift in the comprehension of the capitalist model. This model, traditionally grounded in industrial and commercial capital, is increasingly orientated towards intangible assets, which are commonly identified

as intellectual capital.

Furthermore, contemporary academic literature is increasingly focusing on the significance of knowledge within the economic framework and as a collective asset of humanity. Notable authors and economists who have explored this topic include Nobel Laureate Joseph Stieglitz, particularly in his 2009 publication "Creating a Learning Society: A New Approach to Growth, Development, and Social Progress[4], which examines education and learning in modern societies and their capacity to disseminate knowledge for fostering economic growth.

It is crucial to underscore that after the conclusion of the conceptual section, through a series of studies on the subject of knowledge, it is essential to transition from a theoretical comprehension of this phenomenon to its incorporation into the legal and institutional framework.

***The Organisation for Economic Co-operation and Development (OECD)**:

in 1996, this organization defined the knowledge-based economy as one fundamentally centred on the production, distribution, and utilization of knowledge and information[5].

***The World Bank:**

According to the World Bank: "The Knowledge Economy, the Kam Methodology, And World Bank Operations, defines the knowledge economy as an economic model where knowledge serves as the primary accelerator for economic growth".

Within this framework, she supplemented this concept with four pillars to construct the knowledge-based economic model:

• A sufficient economic and institutional framework.

• A highly proficient workforce (knowledge workers).

• An ecosystem conducive to innovation and scientific inquiry.

• The accessibility of contemporary information and communication technologies and infrastructure[6]

***The United Nations Educational, Scientific and Cultural Organisation (UNESCO):**

They delineated the knowledge economy through its research centre as «An economy in which ideas and knowledge are prioritised over material resources, and in which innovation and technology embedded in services and manufactured products are recognised as the keys to job creation and higher standards of living[7]".

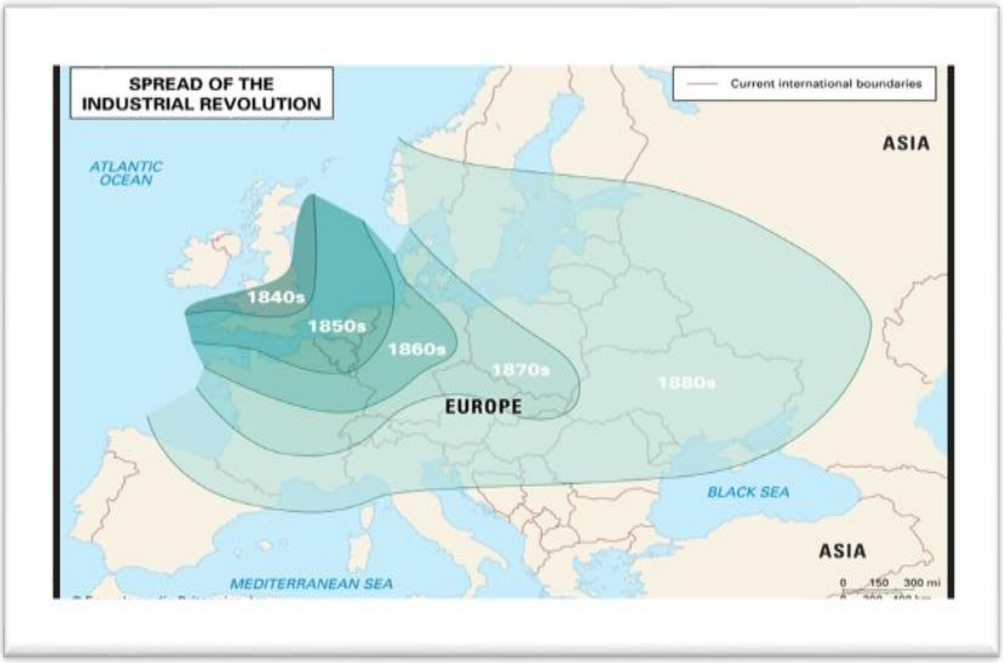
In conclusion, we could potentially define the knowledge economy as an economy of products and services produced with human capital knowledge, skills, and intellectual property rather than physical assets such as land and physical labour. It refers to the ability to capitalize on scientific discoveries and applied research[8]

2.2 The Chronology of the Knowledge-Based Economy:

2.2.1 The Industrial Revolution

The start of the first phase of the Industrial Revolution in the nineteenth century in Europe represented a profound transformation in our understanding of the relationship between humans and knowledge, heralding the decline of a socio-economic and political paradigm based on philosophy and speculative thought, pre-dominantly confined to religious and limited academic institutions. Knowledge and learning evolved into a means of material production and a system for arranging technical activity, facilitating significant scientific discoveries and inventions in physics, chemistry, engineering, and other fields.

Figure 01. The spread of the industrial revolution



Source: **Encyclopaedia Britannica**[9]

"…Prior to that period, the process of manufacturing cloth was laborious and time-consuming. After wool was gathered, it had to be spun into yarn and

then woven into fabric by hand. The spinning jenny, invented by James Hargreaves in 1764, made spinning yarn easier. In 1793, Eli Whitney invented the cotton gin, which helped clean cotton after it was picked. These and other devices enabled increased production with less human effort."[10]

The notion of the Industrial Revolution indicates the transition in modern history from an agrarian and artisanal economy to one primarily characterised by industry and mechanised production. The process commenced in Britain where the Industrial Revolution predominantly flourished from the 1760s until the 1830s.[11] The revolution spread gradually from Britain to Europe, the United States, and other regions globally as illustrated by this map.

Since the 1970s, many researchers have noted the transition that has Occurred in advanced industrial nations from a manufacturing-based to services-driven economy[12], marked by a new trend and paradigms, following the industrial revolution that transformed the world from a mechanical economy characterized by significant scientific and technological advancements.

This shift marks the emergence of the knowledge economy in its contemporary evolution, an economic paradigm in which wealth and production capabilities result not from natural resources and industrial technology, but from innovation, scientific research, and creativity.

Three elements that determine the energy and vibrancy of the economy, as well as the authority and resilience of the state that controls its operations. Consequently, various elements and factors have facilitated the emergence of this new economy, including the digital revolution, the democratization of scientific education, funding allocated to scientific research, and advancements in communication technologies. These developments have led to the creation of a new form of capital known as intellectual capital, which encompasses the totality of knowledge, expertise, and accumulated know-how within an individual or organization, and, in general, within the modern state.

This shift signifies a transformation in the historical trajectory of the economy and global political economy, as we encounter a production model that intricately connects technology with the generation of goods and services, prioritizing the state capable of converting its intellectual capital into a productive and competitive economic framework, thereby enhancing its political influence in international relations.

2.2.2 The 4.0 Economy

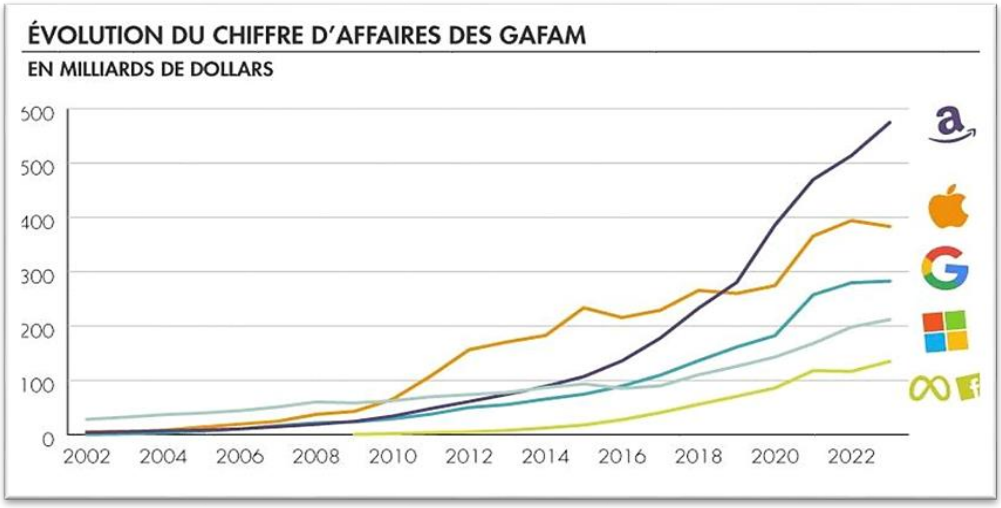
Since the late 20th century, the world has been characterized by dynamism

and unprecedented rapidity in communication, production, and economic structure, where knowledge has transitioned from a means of production to a strategic and essential asset for states, influencing their hegemony and global standing.

Furthermore, it transcends mere interstate competition, serving as a source of strength for societies and enterprises that generate information, reflecting a transformation in the human-machine connection that has led to what economists term Industry 4.0. In summary, artificial intelligence, cloud computing, and big data management are the most important accelerators of this new paradigm.

The Fourth Industrial Revolution The state, previously the principal classical actor in economic and political interactions, is no longer the exclusive owner of this power; rather, it is currently challenged by the increasing importance of big technology firms such as Google, Meta, Microsoft, Amazon, and Apple Inc. In 2015, the 100 largest firms globally by market capitalization, over half of which are American, nearly equalled the American GDP of over 16 trillion dollars: Apple, Google, and Walmart are among the foremost.

Figure 02. The development of GAFAM's revenue.



Source: **lafinancepourtous.com Statista and Apple**[13]

This graph illustrates a comparison of the income of GAFAM (Google, Apple, Meta, Amazon, and Microsoft) from 2002 to 2022. Amazon apparently dominates its competitors due to its e-commerce approach; nevertheless, all these knowledge-based enterprises keep demonstrating growth in both capitalization and commercial value. The graph illustrates that these information enterprises

exert a substantial influence on both economic and political relations, as a single revenue number from Amazon, for instance, surpasses the GDP of multiple governments.

2.3 The Models of the Knowledge-Based Economy:

We will discuss the theoretical foundations established and reinforced by governments and businesses in the growth of a knowledge-based socio-economic model, covering various dimensions, including ideology and political paradigm, funding allocated to scientific research, and the social and institutional framework.

2.3.1 The Liberal model

It is a major figure in the evolution of the knowledge-based economy, where knowledge creation arises from an extensive process of invention and scientific experimentation, firmly founded on a free market defined by entrepreneurial initiative. Personal creativity and entrepreneurship. This paradigm argues that all elements relies on free will and the free market, with a non-interventionist state in economic affairs, particularly regarding legislation and regulation, with its job confined to establishing infrastructure that facilitates market dynamism. In conclusion, many scholars and experts in economic and political sciences regard the United States of America as the ultimate incarnation of the liberal model for a knowledge-based economy.

2.3.2 The Developmental Model

This model, in contrast to the liberal approach, fundamentally depends on state intervention in the execution of public policies to create an advantageous atmosphere for the advancement of the knowledge economy. The experiences of Asian nations such as Japan, China, and South Korea illustrate the dedication of public authorities to constructing this economic paradigm focus on innovation and creativity through strategic public policies,

which are occasionally devised at the central government level, yet reflect a capitalist ethos focused on market profitability and competitiveness.

Nowadays, China is a significant contributor to knowledge and technology production, characterized by substantial public and private investments in the high-tech industry. China has made substantial investments in infrastructural and technical development initiatives, including public institutions, research centres, and incubators.

This model illustrates an alternative strategic direction initiated by the State

and public authorities to establish an economic development framework centred on innovation and scientific creativity, achieved through the implementation of priorities and the selection of public policies, alongside the enhancement of public-private partnerships that strengthen the State's competitiveness in the global knowledge market.

2.3.3 The European Model

Concerning the European model, driven by a measured movement and confronting intense competition for access to the latest advancements in the knowledge economy. Particularly the innovation market and technological development, the European Union, as a regional entity in the new millennium, has formulated a unified strategy to secure its position in the global competition for new knowledge by The Lisbon Strategy 2000.

Formulated by the European Commission during Romano Prodi's presidency and approved by the European Council, is detailed in the conclusion of the presidency on March 23 and 24, 2000, in the chapter titled: Preparing the Transition to a Competitive, Dynamic And Knowledge-Based Economic[14] **.**

Articles 08 through 23 of this document outline the European perspective on transforming to a competitive knowledge-based economy, highlighting investment in innovation and the advancement of information societies,

Thus encouraging entrepreneurship as well as encouraging scientific research to generate new employment opportunities, facilitate digital transformation, and attain sustainable development objectives. Followed by the Europe 2020 strategy, focused on smart, sustainable, and inclusive growth, initiated by the European Commission in the post-2008 financial crisis era, and geared towards digital technology, innovation, and environmental protection, with an investment of 3% of the European GDP for research and innovation in Europe[15] as a set objective.

Still, it is crucial to understand that, despite all European initiatives, the knowledge economy is still less developed than that of the USA and China.

A 2023 OECD study on the knowledge economy indicates that the USA leads in R&D expenditure at 3.46% of GDP, followed by China at 2.45% of GDP in 2014, surpassing the European Union's 2.15% of GDP[16]. This indicates that Europe is deficient in public investment in the knowledge economy and innovation, notwithstanding the various budgets and programs established by the European Union.

3. The position of knowledge economy in the European model

Following an overview of terminological and conceptual foundations, as well as the evolution and models of the knowledge economy, this second section will

concentrate specifically on the role of this economy within the European Union. It is essential for clarifying the innovation and research framework by investigating the institutional and legal underpinnings, particularly concerning invention patents and intellectual property. This chapter will conclude with an evaluation of the knowledge economy and its ecosystem in select European nations.

3.1 European Public Policies Concerning Innovation

Since the 2000s, the European Union has implemented a comprehensive strategy within public policies focused on innovation and knowledge to facilitate an effective transition to a knowledge-based economic model, as detailed in the previous sub-chapter on the European model. To implement this European strategy, an institutional framework and various programs have been established to provide a conducive environment for the emergence and development of the knowledge economy through multiple European entities focused on knowledge accumulation, scientific research, digitization, and innovation. The following are the principal institutions that embody the European Union's aspiration to establish this knowledge-based ecosystem.

3.1.1 The European Research Council

According to the official website of The European Research Council (ERC) is the premier European funding organisation for excellent frontier research. The European Union set it up in 2007 and, in the context of the Horizon 2020 programme; it is the go-to organisation for funding. It gives money to creative researchers of any nationality and age to carry out projects all over Europe.

This council aims to fund high-quality research initiatives across diverse scientific fields. Its budget for 2021 to 2027 exceeds 16 billion euros, thereby augmenting the European Union's appeal to global scientists. This council's official website indicates that it has generated over 2,200 patents, and participants of its program have established more than 400 start-ups, as well as received 14 Nobel Prizes and other international awards[17]

3.1.2 European Innovation Council

Established in 2008 under the Horizon Europe initiative, the institution's primary objective was to facilitate training and collaboration among universities, research centres, and businesses from both sectors within the context of the Knowledge and Innovation Communities. It has a budget of €10.1 billion, to support game changing innovations throughout the lifecycle from early stage research, to proof of concept, technology transfer, and the financing and scale up of start-ups and SMEs[18].

In addition, Approximately 9,900 start-ups have received help for innovation training, backed by an investment budget exceeding 9.5 billion euros1. Beyond these European institutions, the union has implemented additional mechanisms to enhance the appeal of the European knowledge market and attract scientists, as well as what economists refer to as knowledge workers or highly skilled professionals.

3.2 The Models of a Knowledge-Based Europe as a Leading Actor in the International Relations

Having previously analysed the multifaceted dimensions of the knowledge economy and its status within the European Union, we will now concentrate on the conditions and factors that could establish the European Union as a cornerstone of the knowledge economy and elevate it to a hegemonic power akin to the United States and China in the contemporary global landscape**.**

3.2.1 The Scientific diplomacy

This strategy depends on the function of scientific and technological collaboration as diplomatic tools between nations and the enhancement of inter-state relations[19]

Establishing connections with diverse scientific organizations, particularly in developing nations, aims to enhance accessibility for collaborative projects and facilitate researcher mobility through internships or scholarships in Europe. This initiative aims to attract the most qualified individuals, integrating them into the scientific research framework in Europe, thereby contributing significant value to the European innovation system. As articulated by the European Union, this program embodies "science at the service of diplomacy."

Europe, endowed with its complete legal and regulatory framework, is a trustworthy partner in scientific diplomacy, frequently seen as a benchmark for data protection, intellectual property, and the European repository for invention patents.

3.2.2 Lower dependence and the improvement of technical sovereignty

Despite significant European progress in innovation and scientific research, along with substantial budgets and various policies and institutions aimed at

[1] Across Europe, Knowledge and Innovation Communities (KICs) are networks working to address specific societal challenges, from sustainable energy to climate change and everything in between. They are communities of: higher education institutions; Research centres, businesses and investors, and public and non-profit organisations

fostering a knowledge-based economy, Europe continues to rely heavily on external processes and technical expertise, particularly from the United States and its research and development centres, such as GAFAM.

U.S. companies, including Amazon Web Services (AWS), Microsoft Azure, and Google Cloud, control a staggering 92% of Europe's cloud infrastructure. This dominance is largely due to their early market entry, significant infrastructure investments, and aggressive expansion strategies, making it difficult for European alternatives to compete at scale (EU).

Moreover, the European Commission, to catch up with these challenges, had already taken the initiative to strengthen its capacities regarding the preservation of digital and technological sovereignty, such as following program

The Chips Act will also allow Europe to achieve its digital decade goal: double its global semiconductor market share to 20%[20], which Aims to reduce digital dependency in the strategic sectors of the European Union.

3.3 The EU as a global actor of hegemonic power:

3.3.1 The European Union's portrayal as a global hegemonic power

Examine the European Union's policy that constructs an image as both a stable and normative partner. While simultaneously aiming to establish itself as a "soft". Hegemonic force through its model of normative hegemony, "Global Norm setting", according to the American scholar Bradford, Anu author… "The EU gains from "incidental externalities" connected to the single market, and the EU's internal goals are not at conflict with its external goal of shaping the global regulatory environment and pursuing global influence.[21]

The European model perceives knowledge and skills not merely as commercial products, but as part of an institutional and regulatory framework designed to cultivate innovative competencies. This framework encompasses regulatory elements such as data protection, green innovation policies, and the education and higher education system (Bologna Treaty), along with other European mechanisms that collectively seek to shape global policies and reinforce European hegemony within a cooperative context.

Also according to Erixon website, «It is in the EU's best interest to support a rules-based international order with... International cooperation should extend beyond trade to include technology policies, such as those relating to artificial intelligence. Regulatory cooperation with allies such as the USA is essential for setting global standards that are based on shared values, and this can be achieved by working together to establish common goals and standards.… "[22]

Beside other important actors in the knowledge economy, especially the USA, which espouses similar ideas. At In the conclusion of this subchapter, it is evident that the European Union possesses considerable assets in knowledge and science, which could afford it a prominent global standing.

However, this demands an inquiry into its genuine potential to emerge as a hegemonic power via the knowledge economy, which is contingent upon its capacity for action, the mobilization of intellectual capital as indicators of strategic influence beyond European borders.

In addition, the necessity for augmented investment in high-tech sectors, alongside addressing challenges related to technological dependence and occasional deficiencies in collective political will.

3.3.2 The Limitations of the European Knowledge Economy Framework for a Hegemonic Power Model

To address the weaknesses of the European framework regarding the knowledge economy and its contribution to international hegemony, we will analyse the main limitations of this model in comparison to other models recognized for their dominance in hegemonic power, not just through military and economic prowess, but also via their capacity for innovation and the generation of knowledge and technologies.

The equation of European mechanisms for innovation and hegemony despite substantial budgets intended to enhance attractiveness and promote innovation within Europe, exemplified by the Horizon Europe initiative allocating over 93.5billion euros for the 2021-27 period[23], the European Union has not emerged as a technological superpower comparable to China and the United States. The important aspect involves not financial resources or programs, but rather the capacity to convert technological advancements into instruments of influence and strategic hegemony for the State.

The technical advancements of the United States and China, It is essential to highlight that certain European Union member states, including Germany and France, exhibit favourable rankings in creativity and innovation. However, Europe as an entity remains deficient in several high-tech sectors, particularly in artificial intelligence and other technical domains, where it is significantly reliant on both China and the United States, as indicated by the World Intellectual Property Organization's report on generated artificial intelligence[24]

Ultimately, despite the innovative environment and the European Union's status as a global scientific hub, it fails to convert these characteristics and resources into strategic domination and hegemonic influence on a worldwide

scale. Independence in technological innovations and a cohesive policy are crucial for maintaining internal disparities in technological advancement among the union's member states. This model possesses significant promise; yet, it has not yet attained the hegemonic influence of the American and Chinese models in the context of the information economy.

4. Conclusion:

By the end in a constantly changing interdependent world, knowledge and expertise are crucial for understanding the power and hegemony of states and other actors in international relations, as previous political science and international relations literature, particularly realist theories, emphasised military and strategic power.

It is evident that the knowledge economy exceeds a traditional production model, serving as a crucial component of the state's capacities and its dominance in the international arena. Our study aimed to better understand and analyse the phenomena of knowledge and the establishment of a knowledge-based economy as an instrument of growth for national economies.

The study focused on clarifying the status of the knowledge economy and the innovation ecosystem in Europe through various mechanisms established by the Union, including budgets and continental institutions. Ultimately, this study examines the relationship between Europe's progressive shift towards a knowledge-based model and other dominant knowledge models, notably those of the United States and China, which integrate both military and technological strength**.**

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