

## **THE KNOWLEDGE REVOLUTION AND ITS IMPACT ON GLOBAL ECONOMIC DEVELOPMENT IN THE KNOWLEDGE ECONOMY**

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### **ABSTRACT**

*Knowledge has always been perceived as the main pillar of economic growth. Major economists such as Adam Smith, Karl Marx, Alfred Marshall and Joseph Schumpeter (1939) have emphasized the importance of knowledge through its components: skills and competences, organizational process, the development of new technologies and innovations, in order to increase productivity and economic development in a sustainable manner. Lately, the importance, magnitude, scope and field of application of knowledge in economic growth seem to have intensified. Today, much more attention is paid to a new, global economy, called the knowledge economy in which the importance of the information, skills and know-how is critical, especially for large corporations, for the success of local, national or regional economies. The new knowledge economy is materialized in the emergence of new firms and new industrial branches, in a context of real-time interconnections of global influences and speed.*

*The present paper aims to make a temporal incursion and a dynamic analysis of the steps that have been taken in recent years through the specialty literature related to the topic proposed for the research. The specialized literature, in the spectrum under investigation, includes leading names in the fields of knowledge economy, entrepreneurship, innovation and new technologies such as: A. Smith, M. Friedman, P. Drucker, D. Kahneman (2011), K. Marx, A. Marshall, J. Schumpeter, Nonaka and Takeuchi (1995), A. Toffler, but also reports, articles and studies of national and international bodies and organizations. In this context, we present the debates which have been over the years between the great economists and which gave birth to the definitions of this concept so controversial; and we outline aspects of the revolution brought by knowledge and its impact on global economic development.*

**KEYWORDS:** *knowledge, knowledge economy, economic development, new technologies, entrepreneurship*

**JEL CLASSIFICATION:** *O11, N14, E02*

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### **1. INTRODUCTION**

The new knowledge economy is materialized in the emergence of new firms and new industrial branches, in a context of real-time interconnections of global influences and speed. The fundamental features are globalization and digitization, characterized by the intangibility of international transactions materialized both through trade flows and through direct investments. However, the process of knowledge is not limited only to computerization and digitization. The main activities of wealth creation will no longer be neither capital allocation for productive uses nor labour, the two poles of economic theories of the 19th and 20th centuries, which are: classical, marxist, keynesian, or neoclassic theories. Value is now created by productivity and innovation, both representing the application of knowledge at work. In this context, the economic challenge of

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post-capitalist society will therefore be the productivity of knowledge-based work and knowledgeable workers (Drucker, 1999).

## **2. CONTEMPORARY DEBATES IN DEFINING THE CONCEPT OF THE KNOWLEDGE ECONOMY**

The world economy has changed from an industry-based economy into a knowledge-based economy (Drucker, 1969), where the competitive advantage of organizations is based on the ability to exploit knowledge resources. The increased importance of knowledge as an economic resource has been reviewed from several perspectives, resulting in different notations, each of them usually emphasizing a different aspect, but related to the same phenomenon. Some examples in this regard are the 'knowledge society' (Toffler, 1983), the 'know-how society' (Sveiby & Lloyd, 1988), the 'information society' (Giddens, 1994; Harrison & Kessels, 2004), 'network society' (Castells, 1996), the 'intangible economy' (Andriessen, 2004a) and the 'creative economy' (Florida, 2002). Knowledge economy, where knowledge has become the main competitive advantage is a new phenomenon. The transition to the knowledge economy is about increasing the scale level of knowledge as a factor of production. Knowledge is not a new factor of production, but the relative importance of knowledge related to land, labor and capital has increased substantially over the last few decades (Castells, 1996; Weggeman, 2000). Knowledge is the revolutionary substitute for other resources (Toffler, 1983). The new growth area, now and in the years to come, is based on the manipulation of information on a very small scale, rather than the mass processing of raw materials. The shortage of natural resources in the information era has been accompanied by an increase in the importance of mental activity (Gorji & Alipourian, 2011) and a decrease in that of physical labour (Davidson, 1993). The new economy is dominated by information and its generation, procession, storing and transmission. This aspect of information is the most valuable part of any business. The information-based economy is more stable and more valuable than the conventional economy (Cohen, 1993). Formal growth through accounting evidence, accounts and daily experience all suggests that, something extra, such as innovation, inventions, technological transformations, or discovery of new ideas, is necessary to understand and explain growth (Romer, 1992).

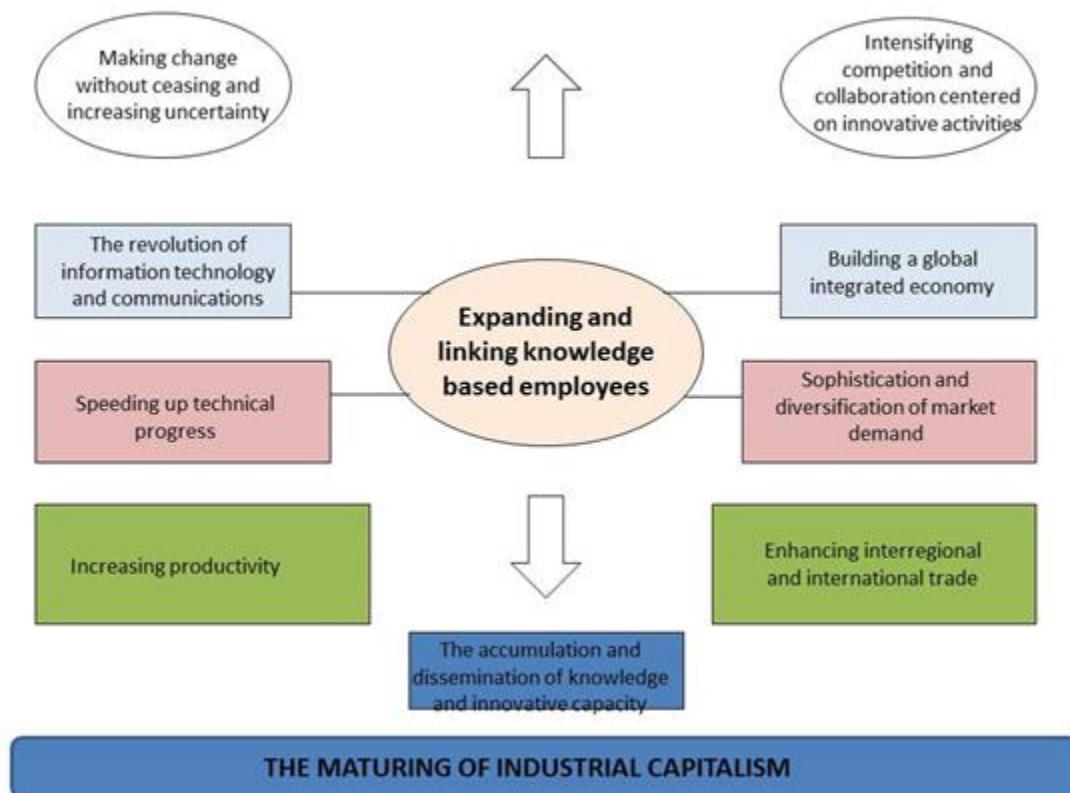
According to Thomas Stewart, 'the knowledge economy', as any economy, means money in the context of buying, producing and selling knowledge (Stewart, 1998). Whereas Adam Smiths' 'wealth of nations' depended on the specialization and division of labour within the nations, new wealth depends on information, communication technology and in-depth knowledge at a global level. But, still, the academic researchers don't fully understand how knowledge acts as a resource. There is not yet sufficient experience to formulate a theory to be subjected toward testing. We can only say there is a stringent need for such a theory. We need an economic theory that puts knowledge at the heart of the productive process of wealth. Such a theory can explain the current economy and only it can explain innovation (Drucker, 1993).

As a conclusion of the incursion into delimiting the concept we can say that, in essence, the knowledge-based economy is characterized by the transformation of knowledge into raw materials, capital and products. The underlying factors of the economy, through economic processes, in the context of which the processes of generation, sale, purchase, learning, storage, development, delimitation and protection of knowledge become the predominant activity and decisively condition to the achievement of profit and to the sustainability of the economy (Nicolescu & Nicolescu, 2005).

## **2. KNOWLEDGE AND IMPACT ON GLOBAL ECONOMIC DEVELOPMENT**

Along the last quarter century, the global rate of knowledge creation and dissemination has grown significantly. One reason is that advances in information and communications technologies (ICT) have decreased considerably the cost of energy and the electronic networks. With increasing

accessibility, the use of computing power and electronic networks has developed also the process of efficient dissemination of existing knowledge, (Brătianu & Bejinaru, 2016). New modern technologies now allow researchers from different geographic regions to work together and share their accumulated knowledge, what, therefore, increases productivity, resulting in the rapid progress in research and development, as well as the generation of new knowledge and technologies, developing a perpetuation of the cycle of creation and continuous innovation. Thus, the knowledge revolution, together with increased globalisation, presents significant opportunities for promoting economic development but with important implications and in related fields such as social, cultural or environmental (Suh & Chen, 2007).

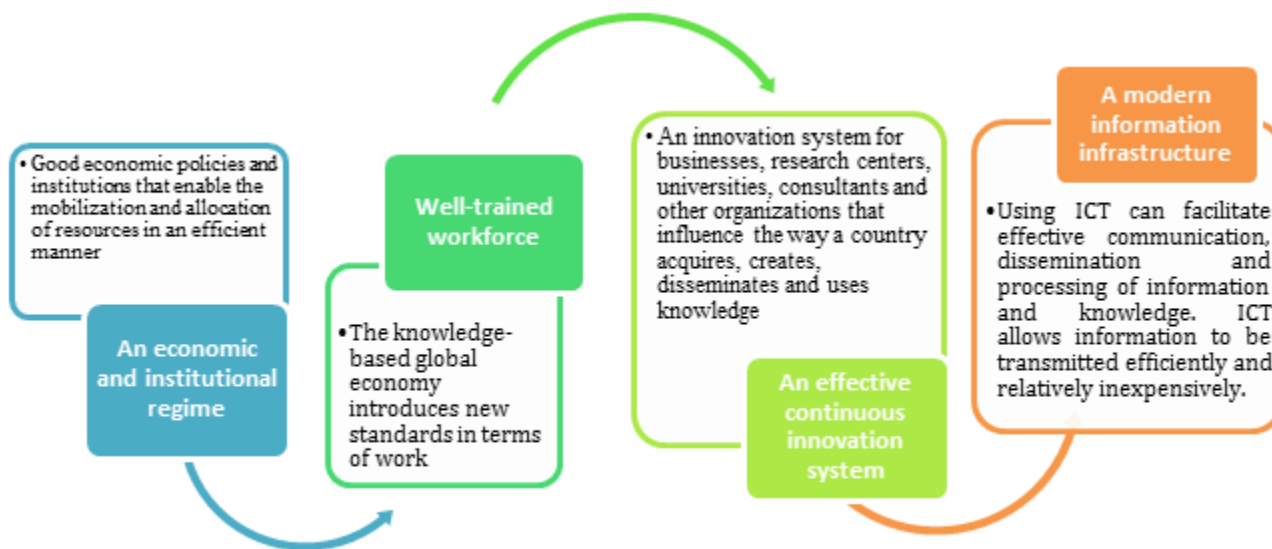


**Figure 1. The transition to the knowledge-based economy**

*Source: Nicolescu & Nicolescu (2005, p.20)*

A knowledge-based economy is one that uses knowledge as essential engine of economic growth. The representation of the maturity of industrial capitalism is presented in Figure 1. This is an economy in which knowledge is acquired, created, disseminated and used effectively to enhance economic development. Many emerging countries fail to capitalize on the vast world-wide stock of knowledge and apply it to their needs. It should not be denied this vital tool for growth. Building on its strengths and on a proper planning of investments in human capital, effective institutions, relevant communications technologies as well as innovative and competitive businesses, emerging countries can harness products of revolution of knowledge. With sustainable use and knowledge creation at the heart of the process of economic development, an economy becomes, in essence, a knowledge economy. It is an economy in which knowledge is acquired, created, disseminated and used effectively to enhance economic development. Successful transitions to the knowledge economy typically involves items such as long-term investments in education, expanding the capacity for innovation, modernization of the infrastructure of information and have an economic environment conducive towards market transactions, (Hapenciuc et al., 2016). The knowledge economy framework supports investments in the four pillars for sustained creation, adoption and use of knowledge in domestic economic output, which will be transformed into goods and services

with higher added value. Contrary to some beliefs, the concept of knowledge economy does not necessarily revolve around high-tech or information technology (IT). For example, the application of new techniques in subsistence agriculture can significantly increase yields, or the use of modern logistics services can allow traditional handicraft sectors to serve wider markets than before. The successful transition to a knowledge-based economy typically involves elements, such as long-term investment in education, the development of innovation capacity, the modernization of information infrastructure and a favourable economic environment. The World Bank (2006) has called these elements the pillars of the knowledge economy and together forms the framework of the knowledge economy. The four pillars of the knowledge economy framework are represented in Figure 2.



**Figure 2. The four pillars of the knowledge economy**

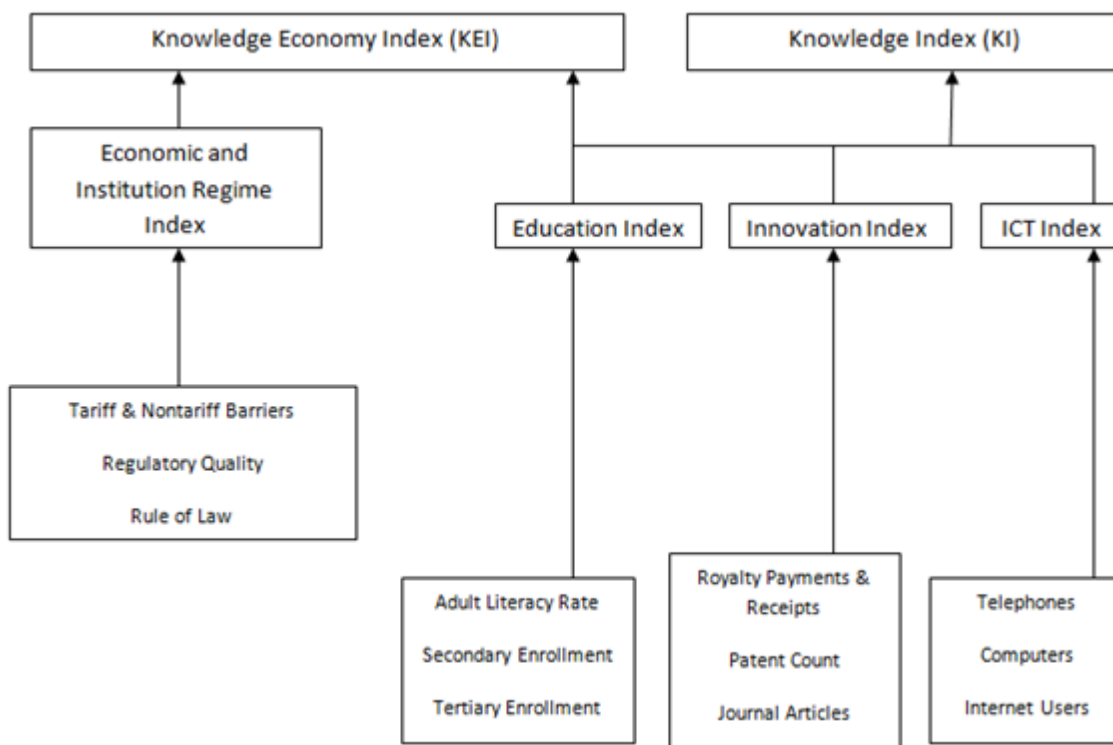
*Source: World Bank*

Knowledge-based economy support, therefore, investments and interactions between these four pillars. Those are needed for sustained creation, adoption, adaptation and use of knowledge in domestic economic output. The outcome will be represented by goods and services with higher added value, which increases the likelihood of economic success in the highly competitive and globalized world economy (Suh & Chen, 2007). The four pillars look in depth outlines the context, which should create it for each nation to develop in accordance with the premises that underlie the knowledge society.

### 3. INTERCONNECTION OF KEI AND KI INDICATORS

In some emerging countries, there is a considerable time lag that needs to be reduced before increasing these benefits brought along with the deployment of technologies. The gap is the time it takes for organizations to assimilate and adapt to the new technology. Also, its facilitators are essential for technology to work. For example, the quality of a country's business environment as well as its attention to technology-specific facilitators significantly affects its ability to make the most of this resource. Chandra and Patkar (2007) argues that ICT facilitation includes appropriate education, skills training, research and development (CD), access to venture capital, Internet accessibility, Internet infrastructure security, and government support for ICT development, and quality ICT support services. Thus, in order for ITC to increase labour productivity efficiently, nations should invest not only in ICT infrastructure but also in facilitating the learning of resources (Gorji & Alipourian, 2011). The knowledge economy framework postulates that the amount of

knowledge and the way in which it is used are the key determinants of the overall productivity factor. Strengthening the four pillars of the knowledge-based economy will lead to an increase in the quantity and quality of knowledge available for economic output in any country. This, in turn, will increase productivity and thus economic growth. The World Bank Institute has developed the Knowledge Based Economy Index (KEI) and the Knowledge Index (KI) for a country classification. Both are represented in Figure 3.



**Figure 3. Knowledge Based Economy (KEI) and Knowledge Index (KI)**

*Source: World Bank (2009)*

The Knowledge Index measures the capacity of a country to generate, adopt and disseminate knowledge. This is an indication of the general potential for knowledge development in a particular country. From a methodological point of view, KI is the simple average of a country or region's normalized performance scores on key variables in three of the pillars of the knowledge-based economy - education and human resources, innovation and ICT system. The Knowledge Based Economy Index takes into account whether the environment is conducive to effectively utilizing knowledge for economic development. It is an aggregate index that represents the overall development level of a country or region in terms of the knowledge economy. The KEI calculation is based on the average of a country or regions' performance score scores on all four pillars of stimulating the knowledge economy and the economic and institutional regimes, education and human resources, the innovation system and ICT components. In calculating the KEI and KI indices, as well as the four pillars of the knowledge economy, the World Bank classifies countries according to a single model of building a knowledge-based economy that applies to all countries. However, each pillar consists of a large number of economic indicators (IE variables) collected:

- Economic and institutional arrangements:
  - Tariff and non-tariff barriers
  - Qualitative regulations
  - Rule of law
- Education and human resources:

- The average of the school years
- The enrolment rate in the secondary education
- The date of enrolment in tertiary education.
- Innovative system:
  - Payment of royalties and royalties
  - Patent applications granted
  - Published scientific and technical articles and studies.

These three variables are available in two forms: relative to population numbers and absolute values. Thus both KE and KIE are also available in unweight and weighted forms. In innovation, the absolute size of resources is important because there are large-scale economies of scale based on knowledge, but these are not always used for this purpose.

The fourth pillar is calculated on the basis of indicators that take into account the following variables:

- Information and communication technology:
  - Number of phones / 1000 persons
  - Laptops / 1000 persons
  - Internet users / 1000 persons

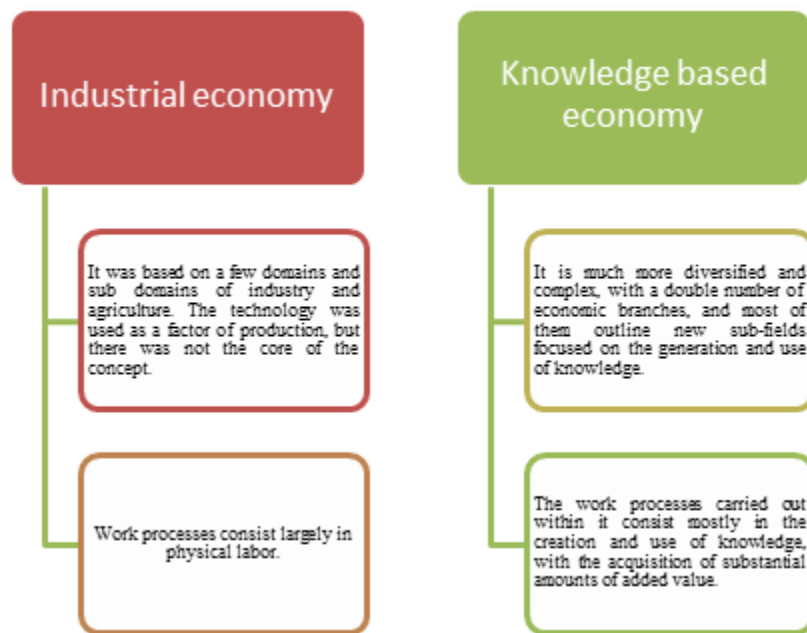
This construction of measuring knowledge in an economy was part of a project launched by the World Bank Institute in 1999 under the name of 'Knowledge for Development' (K4D).

Its objectives were to raise awareness among national policies about the effects of strong knowledge growth and to encourage economists to combine local and global knowledge to enhance comparative advantages. Other similar projects were launched in the same period by APEC (Asian-Pacific Economic Cooperation) 1999, OECD 1996 or ABS (Australian Bureau of Statistics).

#### **4. STRUCTURAL MUTATIONS OF THE KNOWLEDGE ECONOMY IN RELATION TO THE BASED INDUSTRY ECONOMY**

Transforming the current economic context into a knowledge-based one has reflections and changes in essence within the structures of national economies. By making a comparative analysis of the knowledge-based economy in relation to the classical industrial economy, in order to facilitate the sensing of mutations produced and being produced, we present both in Figure 4., as well as the following, significant differences:

- The knowledge economy is not based on deficit, but rather on abundance.
- Unlike most resources that diminish when used, information and knowledge can be shared and thus multiply in fact.
- The location effect is diminished. Using the right technology and methods, virtual markets and virtual organizations can be created based on the benefits of speed and agility, non-stop operation and global expansion.
- Laws, restrictions and taxes are difficult to apply exclusively in a single country, according to the legislation and governance of a single country. Knowledge and information tend to circulate more in areas where demand is higher and barriers are lower.
- Products or services created by the technologies of knowledge can be pioneers of different pricing policies in relation to the previously-created products without the advantages of embedded knowledge.
- Pricing and value policies are highly dependent on the context. Thus, the same information or knowledge may have different values for different people at different times. Knowledge when already stuck in systems or processes has a much higher value than when it is still in the process of free movement.
- Human capital competencies are a key component of value in a knowledge-based organization, but few are the cases where these levels of competence are found in companies' annual reports.



**Figure 4. Structural Differences in the Knowledge Economy vs. the Industrial Economy**

*Source:* Author's own elaboration

Thus, we can see that the structure of the branches of knowledge-based economy is noticeably different from the capitalist economy or industrial one, where the basic branches were industry and agriculture and represented an absolute share in the total active population, as a percentage in GDP production, value added, state budget revenues, etc. (Nicolescu & Nicolescu, 2005).

## 5. CONCLUSIONS

One of the deepest and most elusive elements of history is the size given by the prosperity of 'knowledge' among human societies. Sociologists, psychologists, economists, philosophers have struggled with every aspect of it without having to reach a consensus, however. The study of what we know about our natural environment and how it affects it through the changes we face, our society and our economy should be the central subject of interest for the academic environment in all areas of knowledge. Their propagation is the central theme of the current change, and for this reason it is far too important to be left to the historians of science only. Inventions and scientific discoveries are satellite issues about which the most exciting works in economic history were written. In most of the history of humanity, including the turning points of industrial revolutions - new knowledge has emerged in a chaotic and unpredictable way, and economic history is now once again subject to similar contingencies. Therefore, there is a need for a different approach to the knowledge society that is in line with economic growth, one that takes into account the chaotic nature of the historical processes that created the modern economic civilization of the last quarter of the past millennium. The new society, under the name of the knowledge society, has emerged in both developed and emerging countries with high nuances of technological change, on the basis of the structural elements of the previous society, the industrial society. By far, the most influential factor of this new society that has made its presence felt was the information factor through Information and Communication Technologies (ICT). The emphasis which falls on this tool puts in the shadow of researches major transformations what happens at the structural level, concepts, policies and institutions of industrial society. This has led to an imbalance between the pieces that make up the new societal structure, which has created an uncertain context in terms of clarity of boundaries that should take shape, even sparking a divergence in the academic world in relation to the diversity of names that appeared to define the current context. Among the used names are 'post-

modern', 'post-industrial', 'post-Fordist', 'post-capitalist', 'post-structural', 'post-traditional', 'informational' or 'knowledge'. Knowledge has turned into an important economic asset, perhaps the most important, and began to be integrated also into the management processes, in addition to production, research and development and other sectors. Thus, technological and organizational knowledge are becoming just as important as knowing the fundamental scientific truth.

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