

The transition towards a knowledge economy in Algeria _ways and strategies_

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Abstract:

This research aims to study the importance of the knowledge economy and its relationship to the practices used in Algeria. The research analyzes the reality of the knowledge economy in the country and its impact on these practices, while seeking to understand the extent to which Algeria is ready to shift towards this modern economy. The findings indicate that Algeria suffers from a weak infrastructure for scientific research and innovation, despite efforts in the field of education. The country also faces multiple challenges that hinder progress in this sector. Based on these findings, the research presented a set of recommendations necessary to overcome the significant challenges facing the Algerian economy. Most notably, focusing on developing human resources and enhancing the innovation environment, which contributes to achieving sustainable development.).

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1. Introduction:

Due to the changes and transformations witnessed by the global economy in the past years, especially those related to the revolution of information and communication technology and the spread of globalization in various fields, all countries and governments of the world have tended to value the role of knowledge and the human element as a basic economic resource and a major pillar of growth and economic development, by allocating large budgets for research and development activities and spending on education, and thus the economies of countries have become mainly dependent on the so-called knowledge economy, which is intended for the intensive use of knowledge in carrying out various Economic activities and their growth and expansion, that is, it is an economy based mainly on the element of knowledge as a basic source of growth and enhancing competitiveness. The various countries of the developed and developing world have laid solid foundations to enhance the knowledge and technology aspect and provide an appropriate and encouraging environment for research, innovation and creativity, all in order to establish ways to achieve growth and sustainable development.

With the growing reliance on knowledge as a new pivotal element of production, there have been significant and fundamental developments in various economic and social aspects, taking advantage of the information and scientific revolution. It has become impossible for any country to stay outside this framework, as has Algeria. Knowledge is the resource that enhances the efficiency and profitability of other natural resources. Therefore, the economic problem today is based on the abundance of information and knowledge, not on the abundance of scarce resources. The basis of these transformations lies in the human mind, and knowledge has become a key asset for any progress or growth.

Problematic:

Based on what may arise to us the features of the problem of our research, which can be formulated as follows: What is the reality of Algeria towards the transition to a knowledge economy and how does this help to achieve sustainable development?

Our research proceeds from the premise that the knowledge economy, with its dimensions and pillars, leads to sustainable development in Algeria.

Based on our study of the reality of the Algerian economy and its readiness to integrate into the global economy, it is necessary to identify the obstacles that stand in the way of achieving the Sustainable Development Goals. Algeria faces a set of challenges that require a clear redrawing of a strategy to achieve this integration within the framework of sustainable development controls. We seek here to highlight the most important strategic features required to move towards a knowledge-based economy, based on a strategy proposed by the World Bank, which aims to develop a strategic vision that enhances Algeria's ability to achieve the various dimensions of sustainable development, where we will address this through the following axes:

1. A conceptual approach to the knowledge economy
2. Effects of the knowledge economy on economic development
3. Knowledge economy strategies as a mechanism for economic development in

Algeria

Importance of the study:

This study is important from the importance of the knowledge economy, whose role has come to be valued by all countries and governments on the one hand, and the importance of achieving growth and sustainable development on the other hand, which is considered the way to achieve the welfare of societies.

Objectives: This study seeks to highlight the following elements:

Identify the major challenges facing Algeria in the context of the knowledge economy, and seek to understand the requirements necessary to promote research and integrate knowledge in all fields.

Searching for the best ways to reduce the digital and knowledge divide, taking into account the possibilities and resources available in Algeria.

Emphasizing the need to develop a comprehensive strategy for sustainable development in Algeria, focusing on the integration of available sources of natural, material and human wealth.

Trying to propose a strategic vision for the process of transformation towards a knowledge economy, aimed at achieving sustainable development in Algeria.

2. A conceptual approach to the knowledge economy and its relationship to economic growth:

The world lives in the age of knowledge, where knowledge and information have become one of the most important wealth and main engines of economic development. From this standpoint, the concept of "knowledge economy" takes its prominent place in the agenda book of countries and organizations wishing to promote economic growth and sustainability, as the knowledge economy is an economic model that focuses on exploiting knowledge and innovation to achieve economic growth and promote sustainable development. This model is characterized by its focus on developing and improving mental and technological infrastructure, promoting investment in research and development, promoting education and skills development, and encouraging innovation and technology transfer.

Knowledge and innovation are key elements of the knowledge economy. Knowledge represents the ability to use, analyze and apply information effectively, while innovation is the process of finding new and creative solutions to economic and social challenges and needs. The relationship between the knowledge economy and economic growth is focused on the effectiveness and efficiency in the use and transformation of knowledge into economic value. When innovation and investment in R&D are fostered, productivity is improved, jobs are created, and the quality of products and services is improved. Thus, strong and sustainable economic growth is achieved.

2.1 The concept and importance of the knowledge economy:

The knowledge economy is a new phenomenon that has recently begun to be studied and discussed, and it is the type of economy that aims to create, produce, transform knowledge and harness it optimally in order to create wealth to a higher degree.

2.1.1 The concept of the knowledge economy:

Before addressing the concept of the knowledge economy, we must give a brief definition of knowledge, which means the combination of technology, information, expertise, skills and wisdom that carry the characteristics of innovation, renewal and creativity and the ability of the individual to store that information to the extent that it can be benefited from (Olayan, 2008, p. 59).

As for the knowledge economy, it means the economy that revolves around acquiring, sharing, using, employing, innovating and producing knowledge with the aim of improving the quality of life in all its fields through advanced technological applications, using the human mind as a valuable knowledge capital, and employing scientific research to bring about a set of strategic changes in the nature of the economic environment and organizing it to become more responsive and in line with the challenges of globalization and information and communication technology (Olayan, 2010, p. 114).

The knowledge economy can also be defined as the economy in which the emergence and investment of knowledge plays a role in the creation of wealth. Wealth in industry was created using machines that replaced human labor and many people link the knowledge economy to technological industries such as communication services and financial services (Khaled and Khatib, 2009, p. 16).

The knowledge economy is also defined as that economy that creates wealth through knowledge processes and services (creation, improvement, learning, application and use of knowledge in its various forms in different sectors based on intangible human assets according to new characteristics and rules (Al-Zoubi, 2006, p. 16).

Based on the above, it can be said that the knowledge economy is that modern economic model imposed by technological developments and radical transformations of societies based on the production of goods to the production of knowledge, which has become the main engine for the development of the economies of countries, meaning that it is an economy based mainly on the production, dissemination and use of knowledge as a basic engine for development and wealth collection.

2.1.2 The importance of the knowledge economy:

The importance of the knowledge economy is highlighted by the role played by the contents of the knowledge economy and its data, and the advanced technologies it produces in various fields and the indicators it needs, and this is what we will address through this element, and the importance of the knowledge economy is reflected in the following (Al-Zarkani, 2009, p. 36):

Scientific and practical knowledge in particular, which it includes for the knowledge economy, is currently the important basis for the generation, increase and accumulation of wealth.

Contribute to improving the performance of organizations, raising their productivity, reducing the cost of production and improving its quality through the use of advanced technical means and methods included in the knowledge economy and the available electronic devices and equipment, software and technologies developed and developed

Increasing the relative importance of direct and indirect knowledge production, especially intangible production, compared to tangible material production

Increasing the relative importance of investment in knowledge and thus increasing interest in knowledge capital, especially in business organizations, which is an investment and formation of intangible capital, and this is caused by the direct impact of the knowledge economy and its technologies.

The knowledge economy contributes to the renewal, creativity and development of the activities of business organizations, which leads to their expansion and growth to a large extent and thus allows the continuation and survival of these organizations and supports their competitive position

2. 2 Components and characteristics of the knowledge economy:

Modern civilization is undergoing a radical shift towards a knowledge economy, where attention shifts from dependence on natural resources and simple manpower to the optimal use of knowledge and information. The knowledge economy is characterized by a set of characteristics and components that distinguish it from other economic models.

2.2.1 Elements of the knowledge economy:

The components of the knowledge economy are as follows:

Knowledge society: It is the society that uses knowledge appropriately in order to control its affairs and make sound and rational decisions, and it is the main commodity and the main source of value-added creation, and therefore economic individuals seek to acquire knowledge and employ it in most economic activities (Othman, 2004, p. 241)

Education: Education is one of the basic components of the economy, as economists such as Adam Smith addressed it in his book *The Wealth of Nations* (Al-Abidin, 2000, p. 37).

Research and development: It is the other of the basic factors and means those studies, research and clear projects whose results are due to various economic activities (Ghaly, 2017, page 30)

2.2.2 Characteristics of the knowledge economy:

There is a set of characteristics and features that characterize the knowledge economy, the most important of which are (Abdelkader and Zain El-Din, 2006, p. 56):

Knowledge economy depends mainly on investing in human resources as an intellectual and knowledge capital widely used in research and applied studies carried out by qualified experts

The knowledge economy has great flexibility and ability to adapt to changes and developments in all fields and fields, especially economic ones.

The knowledge economy has the superior ability to renew, develop and communicate fully with other economies that have become eager to integrate into it so that it has become difficult to separate from them

The knowledge economy has the ability to create, innovate, find and generate new intellectual knowledge products that the markets did not know before, and it also helps to create and find the most satisfying and responsive to the desires of the consumer

Adopting continuous learning and training and retraining, or what is known as rehabilitation and continuous rehabilitation, which guarantees workers high levels of

training to keep pace with developments in the fields of knowledge

The knowledge economy contributes to being an economy of abundance rather than an economy of scarcity, unlike most of the resources that are depleted by consumption, knowledge increases and actually grows in practice and use and spreads with participation.

2.3 Knowledge Economy Indicators (Ghaly Y., 2017, p. 204)

The World Bank WBI has identified a database covering more than 100 countries and 69 variables for the period 2000 to 2012 to assess the status of countries within the framework of the knowledge economy, where the World Bank Institute ranks countries based on knowledge industry indicators, which are calculated based on the average performance of countries on all components of the knowledge economy.

In this part, we focus on some indicators, but not all, especially the indicators in which the clear and broad development has emerged in the contents and data of the knowledge economy, which illustrate sufficient clarity of the knowledge economy and its reality, as it cannot be counted, and this is due to the fact that the apparent economy still knows a wide controversy between the two researches.

_Percentage of R&D spending:

This indicator is calculated from the gross national product or gross national income, as spending on research and development programs has become mandatory for countries that want to reap material revenues due to the high returns provided by the latter if its results are used optimally, and this is due to the knowledge revolution that swept the world (Boutaleb, 2004, p. 255).

_Innovation and creativity:

Innovation is the creation of a new development or modification of a material or production or service process to obtain an economic return (Rezeeq, 2005, p. 119).

2.4 Elements and requirements of the knowledge economy:

In the modern era, the knowledge economy has become a crucial concept in the development and prosperity of countries and societies. The knowledge economy relies on the use and transformation of knowledge and information as a primary source of value and innovation in economic activity. To succeed in this evolving economic model, there are several elements and requirements that must be met.

2.4.1 Elements of the Knowledge Economy:

The knowledge economy is based on a number of basic elements, the most important of which are (Al-Ibrahim, 2004, page 17)

A supportive community infrastructure represented by trained human cadres with a high level of qualification, which by virtue of its existence is considered as a strong pillar of the knowledge economy

_ Educated society This requires focusing on the level of education and working to strengthen rehabilitation and continuous training and the establishment of qualified centers and institutes to advance the level of existing competencies and increase the experience of graduating students in order to ensure a generation of highly experienced workers that promote the economy in light of successive technological changes

Workers and knowledge makers have the ability to absorb modern technology in all its details, i.e. linking the supportive community structure and the educated society to obtain the best possible result from skilled workers with enormous capabilities and capabilities

The presence of information and communication technology service, especially the Internet, which allows interaction with many areas through the services it provides to workers from the speed of obtaining information and the huge amount that it can provide

An effective system for research and development, science and technology of creativity and innovation This system, which elevates the economy through the scientific data it provides, occupies a leading role in raising the economic and knowledge level at the same time for business organizations.

2.4.2 Requirements of the knowledge economy:

In order for the new economy to continue to give and continue to rise, there is a set of requirements that must be available, the most important of which are (Al-Laithy, 2008, p.20)

Restructuring and rationalizing public spending and making a decisive increase in spending allocated to enhance knowledge, through this spending can establish centers for research and development and raise the level of production of organizations and make it comparable to international standards, in addition to that the link between universities and research centers leads to fruitful results while raising the scientific and research level of students and graduating generations with skills and abilities to absorb modern changes in the overall economy

Work to create and develop human capital with high quality and countries must create the appropriate climate for knowledge, as the relationship of knowledge to the environment of society, culture and heritage is not a single relationship, but rather a multidimensional interactive relationship

Investors and business organizations are aware of the importance of the knowledge economy, and it is noted that major global business organizations contribute to financing part of the education of their employees, raising their levels of training and competencies, and allocating an important part of their investments to scientific research and technological innovation.

The existence of a climate of freedom, as knowledge and freedom are two sides of the same coin, and the package of economic, political and social freedoms is the best environment for the production and optimal use of knowledge, and it is a stimulating mechanism for development in its broad human concept (Arab Knowledge Report, page 54)

2.5. Relationship between knowledge economy indicators and economic growth indicators:

Through this part of the research, the relationship between the indicators of the knowledge economy (education and information technology) and some dimensions of sustainable development will be clarified.

2.5.1 Information and communication technology:

Which is considered the backbone of the knowledge economy and has been recognized in the past few years as an effective tool to promote growth and economic development, and the role of information technology in sustainable development can be highlighted through:

The role of information technology in poverty eradication:

There is no doubt that there is an inverse relationship between technological development and the expansion of poverty, so we find advanced countries in the technological field with low levels of poverty less than underdeveloped societies, and there are many studies that have proven that the information and communication technology sector leads to an increase in GDP and income, which contributes to the eradication of poverty and hunger.

_ The role of information technology in the health field:

Technology has helped in the development of various aspects in the health field, such as the application of research and treatments, and the promotion of communication between researchers, doctors and others, as it contributed to raising awareness and spreading it about medicine and health, providing new machines, medicines and treatments, and facilitating communication between patients and doctors.

_ The role of information technology in protecting the environment:

The technological development in the field of industrial machinery has led to an increase in its negative role on the environment, however, technology always offers alternatives, if we use renewable energies, for example, we preserve the environment and modern technology helps to recycle waste, desalinate seawater and others.

2.5.2 Education:

Education for growth and sustainable development is an investment in the citizens of tomorrow in order to make them able to understand the effects of their actions and thus modify their behaviors and the role of education can be highlighted through the following:

The role of education in poverty eradication:

Education affects the conditions of the poor in society, as it represents an essential tool to rid societies of the cycle of poverty as one of the mechanisms responsible for building the intellectual capabilities of individuals, whenever education is good and in line with the labor market, it enables individuals to obtain suitable job positions.

_ The role of education in the health field:

As quality education is the basis of health and well-being, and in order for people to live a healthy life, they need knowledge to avoid diseases of all kinds, and therefore education is an incentive for development and a healthy life.

The role of education in protecting the environment:

It should be noted that environmental education, which is based on the level of awareness of individuals of environmental issues and helping them understand their responsibilities in using available resources wisely, conserving energy and protecting the environment is through arming individuals with knowledge to reduce consumption and reuse.

3. Effects of the knowledge economy on economic development:

Knowledge today is one of the most important drivers of economic growth and development. With rapid technological changes and globalization, the knowledge economy has become a foundation for improving productivity and fostering innovation. The

knowledge economy relies on the use of knowledge and information in various sectors, which leads to improved economic performance and increased competitiveness.

3.1 The impact of the knowledge economy on increasing productivity and improving competitiveness:

Technological development is a key factor in enhancing productivity, as Arab economies can benefit from the technologies available in developed countries through their transfer and localization. Openness to ICTs contributes to raising the efficiency of enterprises, thereby enhancing the growth capacity of economic sectors. For example, in the industrial sector, productivity depends on innovation and the application of the best scientific methods, while modern technologies in the agricultural sector help increase land yield, pest resistance, and improve irrigation management. These developments enhance the quality of agricultural products and meet market needs.

On the other hand, information and communication are a key pillar of the knowledge-based economy, playing a vital role in achieving the competitiveness of organizations. Michael Porter points out that the Internet provides a technological base that facilitates the exchange of information, enhancing operational effectiveness through the use of the best technologies and equipment, the delivery of effective training, and improved management. On the other hand, strategic positioning refers to the ability to deliver unique value to customers, enhancing productivity and creating an economic renaissance. Knowledge is the main source of preference Sustainable competitiveness, with several types of competitiveness distinguishing including cost, quality, technology, and potential (Ghaly Y., 2017, p. 206).

3.2 The impact of the knowledge economy on the quality of services:

The knowledge economy is a modern concept that reflects the shift towards an information and technology-based economy. This economy is based on innovation, knowledge sharing, and the use of technology to improve efficiency and productivity. The knowledge economy plays a vital role in the development of the services sector, including transportation, banking, and tourism, and has multiple implications for these sectors.

On the one hand, information and communication technologies (ICTs) are key factors that have contributed to the improvement of transport services. The use of Intelligent Transport Systems (ITS) has improved traffic efficiency and reduced congestion. Digital applications, such as online booking services and navigation apps, also allow users to access accurate information on appointments and prices, improving the travel experience. The effects of the knowledge economy on the service sector are reflected through improved transportation management through big data and analysis, which leads to reduced costs, increased speed of services, easier access to information, simplified booking and payment procedures, enhancing customer satisfaction, as well as developing new business models such as ride-hailing services (such as Uber) that enhance transportation accessibility (Ghaly Y., 2017, p. 206)..

As for the effects of the knowledge economy on the banking sector, it is reflected through the promotion of financial innovation and the provision of advanced banking services such as online banking, which makes it easier for customers to manage their

accounts and conduct transactions easily and at any time. Using big data to analyze customer behavior and provide personalized services, enhancing banks' competitiveness. In addition to applying new technologies such as encryption and two-factor verification to secure transactions and protect customers' financial information.

On the other hand, the knowledge economy plays a vital role in the development of the tourism sector through the use of technology to enhance the tourism experience. Tourism companies rely on information and data to improve their services and attract tourists. Use social media and digital marketing to attract tourists and provide accurate information about destinations and services. Analyze data to understand tourists' preferences and provide personalized offers and services that meet their needs. Or provide electronic platforms that allow tourists to view information related to destinations, reservations, and evaluations, which enhances decision-making (Al-Laithy, 2008, p. 20).

3.3 The impact of the knowledge economy on e-commerce:

The knowledge economy is one of the main factors that promote e-commerce, which in turn contributes to achieving sustainable development. E-commerce relies on information and communication technologies, which enables the exchange of information, goods and services in an efficient and seamless manner, as the knowledge economy helps to expand the scope of e-commerce by enabling companies, especially small and medium enterprises, to access new markets locally and internationally as well as reach new segments of customers (Olayyan, 2010, p. 114). Digital platforms also allow companies to offer their products and services more widely, enhancing their competitiveness. Improve customer experience by using AI and data analytics to understand consumer behavior and make personalized recommendations. Increase operational efficiency and improve logistics by applying modern technologies in supply chain management and distribution, reducing delivery times and increasing the efficiency of operations.

E-commerce contributes to sustainable development by reducing environmental impact. E-commerce can reduce the need for physical stores, reducing energy consumption and transportation. The knowledge economy also helps to enhance transparency and trust in e-commerce, encouraging more customers to participate (Ghaly Y., 2017, p. 206)...

Secure payment systems and technology contribute to the protection of customers' personal information, boosting their confidence in online shopping. Online platforms provide reliable information about products and services, helping customers make informed decisions.

4. Knowledge economy strategies as a mechanism for economic development in Algeria:

The transition to a knowledge and information economy requires policies and programs that support innovation and creativity, rather than just receiving knowledge. ICTs play an important role in improving areas such as health and education and developing new channels for knowledge dissemination. It is necessary to take into account areas that lack basic infrastructure such as electricity, water and schools. Although the information age may seem unattainable to some developing countries, a knowledge-based economy can

accelerate scientific and technological progress. Economic and social development strategies must therefore include elements that support scientific and cognitive development.

Algeria currently suffers from poor infrastructure and limited investment, which hinders its keeping pace with technological development. Therefore, the strategy of transition to a knowledge economy must proceed from the concept of sustainable development, taking advantage of available economic resources, including natural resources and human resources. Therefore, the strategy should be formulated in accordance with the major areas and basic pillars on which sustainable development is based, to include the fields of economic and social reform, as well as political reform, environmental protection and sustainable resource utilization. A comprehensive vision of this strategy has been proposed, which will be illustrated as follows:

4.1 Field of human and social development:

The knowledge economy is one of the main drivers of human and social development in the contemporary world. This economy is based on the use of knowledge and technology as the main sources of growth and progress, which has profound impacts on individuals and societies.

4.1.1 Human resource development:

Human resource development is one of the essential elements of economic development, as it occupies a prominent place in the field of sustainable development. The human element, with its abilities, skills and knowledge, is a key tool for achieving development. Therefore, it is necessary to seek to qualify and develop human capabilities through education and training, to optimally invest human capital in sustainable development. Develop integrated policies to reduce poverty and raise the level of rehabilitation, which contributes to providing suitable job opportunities for members of society. Provide training and basic skills to encourage acceptance of new ideas and initiatives, especially in the field of transition to a knowledge economy. In addition to accelerating the introduction of modern technologies to enhance human capabilities and raise their scientific and practical levels, which opens new horizons for expansion. With Providing job opportunities for qualified people and granting them privileges and incentives to reduce immigration, and developing policies to nurture talent. Develop plans and programs for adult education and promote continuing education, including e-learning and distance education.

4.1.2 Development of science and technology:

Education and research and development are fundamental pillars of scientific and technological progress, and this requires increased efforts in the field of education to ensure equal opportunities for all children and to eliminate discrimination at all levels of education. The efforts of scientific research institutions should be strengthened as an investment that benefits development, with the need to increase expenditures on research and development, which remain low. It also requires continued education reform and curriculum development through the introduction of modern technologies, facilitating adult and distance education. Cadres should also be trained in communications technology and artificial intelligence, and

accurate information should be provided to researchers and scholars. It is also important to develop new study structures commensurate with the transition to a knowledge economy, encourage scientific research and innovations, and support international exchange of students and researchers. Educational programs should be strengthened to spread digitization in society and create a competitive environment for scientists and researchers. Ultimately, coordination between the public and private sectors and the allocation of appropriate increases to the R&D sector are required due to the high expenditures that these activities require.

4.1.3 Ensuring security and healthy food:

Food security and health are key issues that directly affect the lives of communities, as achieving food security is linked to the development of agriculture and agricultural activities. This requires helping rural people meet their needs through plans that include productive, service, educational and health projects, especially in poor areas. Agriculture plays a vital role in enhancing food security and reducing poverty, as technological knowledge contributes to improving the rational use of agricultural resources and increasing production. Technology also has a major role to play in improving water use efficiency, contributing to the maintenance and enhancement of food security by providing food and opportunity for people. The role of the private sector in raising the level of health must also be strengthened, while continuing government support for health and education. It is important to adopt e-health programs and provide rural and remote areas with health information on prevention and treatment via the Internet and mobile services, through national electronic platforms that provide health care services. Furthermore, programmes should be developed that give priority to crops producing basic foodstuffs, and scientific and practical methods should be used to combat plant diseases and agricultural pests.

4.2 Field of economic development:

The knowledge economy is one of the vital elements that significantly affect the economic development of the modern era. This economy relies on the exploitation of knowledge, information and technology as key resources to boost productivity and growth. With globalization and rapid technological advancement, it is imperative for countries to adopt knowledge-focused strategies as a means of achieving sustainable development.

4.2.1 Agriculture and industry sector:

Promoting agricultural development and achieving food security requires integrated efforts that take advantage of available resources. A favourable climate and the availability of labour are key factors contributing to food self-sufficiency and the elimination of economic dependence. To achieve this, several steps must be taken, including benefiting from scientific expertise and knowledge in the fields of consulting and management, and studying the problems of the industrial sector to develop appropriate sectoral plans. Dependence in the economic and technological fields must be reduced, and the private sector must be supported to complement the state's role in promoting a sustainable economy through production and industrialization. This includes providing the necessary information and studies to encourage industrial projects, and establishing industrial standards bodies to

ensure a suitable environment for projects. Support should also be provided to small and medium-sized enterprises and innovation in the means of production to optimize the use of resources. It requires providing a suitable investment environment to attract foreign investments, and developing policies for the transfer of necessary technology. Moreover, the productivity of available resources must be increased, and modern technology must be used to achieve increases in agricultural and industrial production. It is important to strengthen the link between agricultural research centers, promote development programs, and establish a databank to study agricultural policies. Finally, decisions must be linked to the necessary time recommendations to ensure their implementation in line with development goals.

4.2.2 Service sector infrastructure:

Service infrastructure is a prerequisite for building and developing the economy, and includes the transport, telecommunications, and tourism sectors. The development of this infrastructure requires improving transport, road and port infrastructure, as well as facilitating international trade through data exchange and electronic operations. The infrastructure of communication technologies must be equipped and the legal systems related to them must be developed. Communication technology support programmers and training of tourism cadres should also be implemented, including the creation of portals and websites to promote Algerian tourism products. It is also necessary to design institutional formats such as technology clusters, and work on the formulation of legal frameworks for the protection of digital content. Investment in robotics-based projects should be encouraged by offering facilities such as loans and tax breaks, and organizing international exhibitions to introduce companies involved in these industries.

4.2.3 Commercial and financial sphere:

ICTs enable increased business opportunities and enhanced contracting between trading partners, removing traditional barriers to the flow of products, services and information. This technology also leads to the development of the transport, communications and industry sector, enhancing trade exchanges. To achieve this, the establishment of IT companies and the provision of Internet services to beneficiaries should be encouraged, thus contributing to the diversification of commodity production and opening up new market opportunities. Business contracting and electronic payment flows should also be facilitated. It is important to activate e-commerce applications over electronic networks that ensure integration between suppliers, manufacturers and merchants, which enhances the effectiveness of use. Furthermore, training in the field of e-commerce should be provided, and educational programs should be provided that enhance understanding of the field. It also requires building legislative and regulatory systems that respond to e-commerce requirements, boosting consumer confidence and combating fraud. The shift towards electronic payment systems, the establishment of electronic banking networks, and the development of financial and administrative institutions to operate on digital foundations should also be accelerated. To boost trade, accurate and instant information must be provided to investors, while preparing a generation of entrepreneurs through intensive training in the use of electronic applications in the fields of business and

investment.

4.3 Field of political and administrative reforms:

Achieving sustainable development requires the government to adopt new roles of coordination, regulation, legislation and support to create conditions for the private sector to operate, thus contributing to the implementation of programs to address poverty and employment. The Algerian state has carried out economic and administrative reforms aimed at improving the performance of government institutions, promoting the principles of good governance and combating corruption. However, reality shows the lack of public participation in reform projects, the misuse of resources and the spread of corruption. In this context, modern technologies enable the use of "e-government" tools, which have become a basic criterion for transparency and effectiveness. To achieve this, e-government strategies should be pursued, including the implementation of real reforms that ensure public participation and rely on the foundations of transparency and good governance through the modernization and digitization of administration. It is also necessary to create websites for ministries and state institutions that contain information about the nature of services and how to obtain them, and computerize public administrations and provide them with technical competencies to bring about changes in government performance and facilitate services provided to citizens. In addition, continuous learning should be integrated into government institutions to equip employees with the necessary digital skills, and provide organizational capabilities to conduct various processes electronically, such as tax administration, documentation and electronic payment.

4.4 Environmental sustainability:

The knowledge economy is one of the key factors contributing to environmental sustainability in the contemporary world. This economy relies on the use of knowledge, information and technology to develop innovative solutions that address environmental challenges and improve resource efficiency.

4.4.1 Strengthening efforts in energy and natural resources:

Natural resources are one of Algeria's most important basic wealth, as their exports depend heavily on these resources. To reduce the impact of their depletion, emphasis must be placed on the exploitation of renewable energies and the development of policies that maintain the management of these resources. This requires preparing a plan for the formation of cadres and making them aware of the importance of considering environmental standards when developing strategies. It is necessary to strengthen research and development activities to improve natural resource technology and adopt sustainable mechanisms. Development linkages must be created linking the natural resource sector with other sectors of the economy to promote development and protect the environment. This includes the development of new methods of exploiting waste and increasing recycling, as well as optimizing the use of natural resources, especially depleted ones, while ensuring their long-term sustainability. Effective policies and programs must also be developed to reduce environmental pollution through the dissemination of environmental culture and awareness-raising. Finally, cooperation in the fields of research and industrialization should

be strengthened through the establishment of bodies and institutions that follow the latest technological developments to exploit these energy resources and exchange technical expertise in this field.

4.4.2 Combating environmental degradation and the question of environmental protection:

Although Algeria has significant advantages in clean energy sources such as the sun and wind, it faces challenges in effectively exploiting these resources. This requires the development of regulatory, legal, economic and educational means, as well as technological means. Regulations and legal texts are among the most prominent tools used in protecting the environment, while economic means include mechanisms such as environmental tariffs and fees. Educational means also play a vital role through the activation of environmental education programs, which aim to educate individuals and develop their environmental abilities and skills. Despite the importance of these programmes, efforts to introduce environmental education into educational curricula are still minimal.

On the other hand, technological developments provide opportunities to expand the uses of existing materials and develop new ones, thus contributing to the rationalization of resource and energy consumption. Rapid innovations in technology and alternative energy make it possible to reduce environmental damage and violations. CP techniques are also an effective means of achieving sustainable development, allowing for greater and more efficient production with less consumption of raw materials and energy, and less waste and emissions. Thus, CP addresses environmental problems radically, making it an advanced preventive step towards environmental protection.

5. Conclusion:

Today, the economic problem has become associated with the abundance of knowledge rather than the abundance of scarce resources, as knowledge is one of the main assets of any economy or society. It is necessary to achieve a fair balance in R&D to control as many sources of knowledge as possible. Today's developing economies, including Algeria, are changing and face significant challenges in the transition towards a knowledge economy. It is therefore essential that Algeria adapt to the new situation. If it is to be able to compete in these regional and international circumstances, it must be innovative and develop the tools that help it deal with changes. This requires identifying and exploiting opportunities and adapting to new technologies and their applications as a strategy to achieve a shift towards a knowledge economy, which is a strategic alternative to sustainable development. Resources should be invested, captured, produced and shared across all sectors, and used to develop diverse development strategies. This will only be achieved by adopting clear strategies and investing in their human resources and competencies, which will lead to a scientific movement and technological innovations that are reflected in the improvement of human life, economic activity and environmental protection. Sustainable development is based on human development, which expresses an equation consisting of human capabilities and economic, political and social opportunities.

First: Testing the validity of the hypothesis:

The knowledge economy, with its dimensions and pillars, leads to sustainable development. Here is the interactive relationship between the knowledge economy and sustainable development, where they feed each other, and the mutual influence between them is comprehensive and profound. This confirms the validity of the main hypothesis on which the study relied, as knowledge is the basis of progress and development, and it is not just numbers or data, but related to the size of its impact and employment in the social, economic and environmental fields. However, the Algerian economy faces significant obstacles in the transition towards a knowledge economy, which hinders the utilization of its uses in achieving the requirements of sustainable development in Algeria.

Second: The results of the study

After researching the subject of the knowledge economy, and based on evidence and studies related to its effects on sustainable development in the country, a number of conclusions were reached as follows:

The knowledge economy has become one of the main foundations of any economic or social system, as it represents a major source of equitable development. This requires constant search for and control of scarce sources of knowledge to make the most of it.

The transition to a knowledge economy is one of the most important challenges in Algeria, especially in light of the rapid transformations in scientific and technological progress. The future of the economy is linked to the elimination of underdevelopment and dependency through the establishment of sustainable development. Algeria cannot stay away from developments imposed by global economic systems.

The study showed how the pillars of the knowledge economy and its data can affect various aspects of sustainability. However, the transition to a knowledge-based economy can only be achieved by providing the appropriate conditions for development. Building an enabling environment requires overcoming disease, improving health services, combating poverty and promoting social justice.

Human resources and the development of their capabilities play a prominent role in the fields of sustainable development, being an essential element in achieving development goals. The Rio Conference on Development and Environment also noted that "human beings remain at the center of sustainable development concerns". Therefore, human capital is what determines the progress and prosperity of societies, as the human element has the ability to innovate and develop.

Scientific and cognitive backwardness is a major obstacle to the Algerian economy to achieve the approach of sustainable development. At the same time, integration into the knowledge-based global economy requires utilizing the tools of economic, social and environmental development, which entails providing a knowledge-learning environment that supports the basic infrastructure to build a knowledge-based economy.

The transition to a knowledge economy is the main entry point for achieving sustainable development. It also represents a strategic alternative to Algeria's development, which requires significant investment in education, infrastructure development, including

communications and the advanced information network, and the establishment of scientific and technological knowledge infrastructure.

6. References:

- 1) Ibrahim, Y. H. (2004). Education and Human Resource Development in a Knowledge-Based Economy. Abu Dhabi: Emirates Center for Strategic Studies and Research.
- 2) Zarkani, K.H. (2009). Knowledge economy and e-learning are two pillars in the efficiency of the human element. Iraq: University of Baghdad Publications.
- 3) Al-Zoubi, A.Z. (2006). The Information and Knowledge Society in the Arab World. Cairo: International Forum on Investing in Information and Knowledge Infrastructure.
- 4) Al-Abidin, M. A. (2000). The Economics of Modern Education. Cairo, Egypt: Egyptian Lebanese House.
- 5) Laithy, H.A. (2008). Knowledge Economy. Amman, Jordan: Dar Al-Safa for Publishing and Distribution.
- 6) Boutaleb, s. (2004). Integration into the knowledge economy. International Forum on Human Development. University of Ouargla.
- 7) Arab Knowledge Report. For the years 2009_2010_2011. United Nations Development Programme. Dubai, United Arab Emirates: Dar Al Ghurair Printing and Publishing.
- 8) Khaled and Al-Khatib, A.A. (2009). Knowledge Management and Information Systems. Jordan: World Book Wall.
- 9) Rezeeq, K. (2005). Innovation Framework. Journal of Economic Sciences.
- 10) Abdelkader and Zain al-Din, b. ;. (2006). The role of creativity and innovation in building a knowledge economy. International Forum on Investment in Information and Knowledge Infrastructure. Cairo.
- 11) Osman, B. (2004). Knowledge Economy Concepts and Trends. International Forum on Human Development and Opportunities for Integration into the Knowledge Economy. Algeria: University of Ouargla.
- 12) Olayyan, M.R. (2008). Knowledge Management. Amman: Dar Al-Safa for Publishing and Distribution.
- 13) Olayyan, M.R. (2010). Information Economy. Amman: Dar Al-Safa for Publishing and Distribution.
- 14) Ghaly, B. B. (2017). The role of the state in the development of the knowledge economy, the case of Algeria. PhD thesis in economic sciences. Algeria: University of Sidi Bel Abbas .
- 15) Ghaly, Y. M. (2017). Pioneering experiences in the field of knowledge economy. Business and Trade Economics.
- 16) Yahya, A. January 2002. In Globalization, Technology and Culture, Introduction to Technology and Knowledge First Edition. Beirut: Dar Al-Tali'a for Printing and Publishing.