

# Iran and Knowledge-based Economy: Challenges and Solutions

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## ABSTRACT

In today's world, we observe a new discussion in economy knowledge in which employing knowledge in all economic activities is emphasized in addition to physical capital and manpower. The importance of knowledge-based economy is so that achieving this kind of economy is considered among the necessities of many countries and makes issue such as the processes of creating knowledge and innovation and converting them to products through investment is the priority of economic policies in many countries. Knowledge-based economy in Iran is clearly suggested in the 20-Year perspective document, but in this path, the country is confronted with a number of challenges indicating that the pillars of knowledge-based economy are not still provided in the country. However, the background for the manifestation of creativities and innovations can be provided by solving the infrastructural weaknesses and appropriate backgrounds such as creating a suitable environment for investments and government's supportive policies and providing ITC infrastructures. Therefore, a considerable step in achieving the goal of the perspective document can be expected.

**KEYWORDS:** Knowledge-Based Economy, Iran, Perspective Document, Development Program

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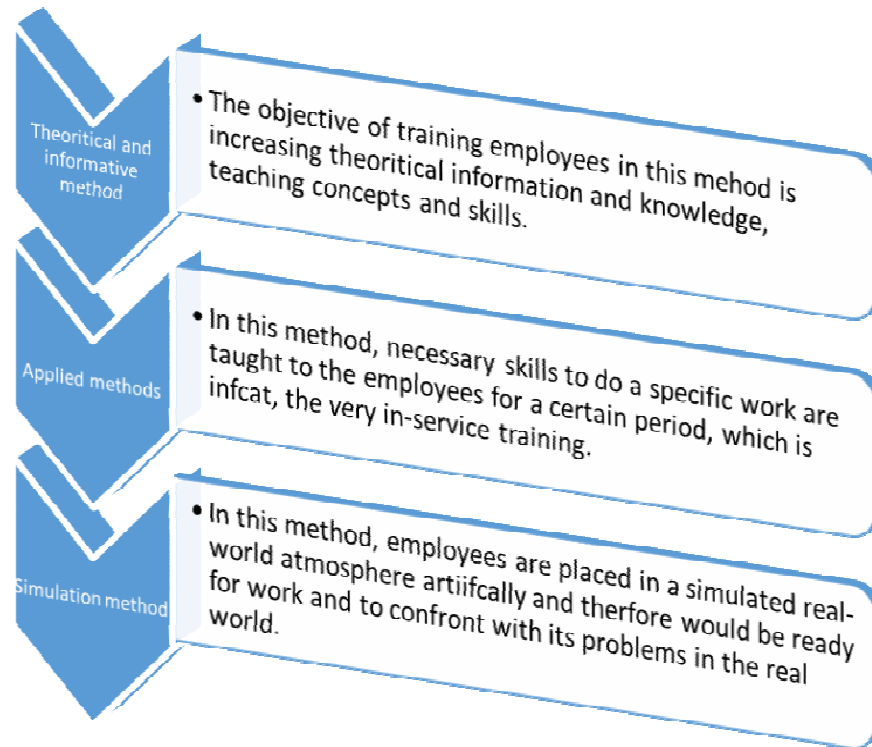
## INTRODUCTION

Nowadays, we observe a new age in economy in which knowledge is considered the main source of wealth and provides a sustainable source for economic enterprises creating value added and increasing competitive advantages in the different manufacturing and servicing processes. The issue makes achieving knowledge-based economy to be regarded among the necessities in many countries, because in the not too distant future, knowledge-based productions will be the criterion for countries' economic power requiring purposeful planning and adopting proper policies to create suitable infrastructures. Therefore, respecting the importance of this issue, it is attempted to explain the pillars and features of knowledge-based economy along with referring to development program, suggestions of challenges and solution in the country while presenting definitions and concepts relevant to the position of knowledge in the theories of economic development. In this direction, the present research is based on descriptive method. The used method in compiling principles and theoretical data is benefitting from library and document studies based on the review of trusted sources and relevant papers. In addition, the observations and reports of the relevant plans in this research are used.

### Theoretical Concepts and Principles

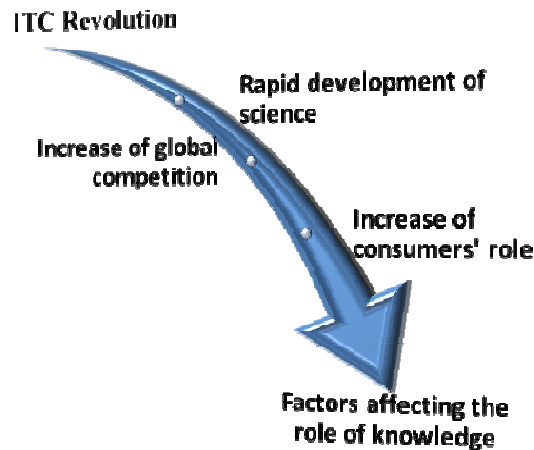
#### Knowledge-based Economy

Organization for Economic CO-Operation and Development (OECD) suggested the term "knowledge-based economy" for the first time in 1996. Knowledge-Based Economy (KBE) is a kind of economy, which is based on production, distribution and application of knowledge and information to achieve economic growth and increase of productivity. In this kind of economy, knowledge-intensive becomes the prominent feature of economy. In fact, in this type of economy, the objective is not only producing and distributing information, but using and employing it emphasized that finally results in the penetration of knowledge in all economic activities. It can be mentioned that KBE is the economic management of human capital that at macro-level includes training all individuals of a society and at micro-level training manpower in economic organizations and enterprises. When training at macro-level is suggested, it refers to the training that all individuals of a society have acquired through formal, academic and general trainings, but micro-level training is by individuals themselves in the form of free and general training by organizations and enterprises in three methods shown in Figure 1.



**Figure 1.** Micro-Training methods in KBE

Theoreticians and experts of economy science consider the reason of stressing the role of knowledge and its modern position originated from factors shown in Figure 2.



**Figure 2.** Factors affecting the position and role of knowledge

**Position of Knowledge in Economic Development Theories**

The theoreticians of economic development have always considered the impact of knowledge in economic growth so that in the eighteenth century to now we observe the emphasis of knowledge in the theories of economic growth and development. Adam Smith [1] in his book titled “An Inquiry into the Nature and Causes of the Wealth of Nations” refers to a class that has foresightedness and contributes to economic growth by generating a kind of knowledge, which is useful economically. In the nineteenth century, Friedrich List, the pioneer of historic school stresses the importance of infrastructures and institutions that develop productive power. He regards generation of knowledge and its appropriate distribution in economy as the origin of the infrastructures and institutions. In that century, Carl Marx influenced by Hegel’s theories has believed the role of knowledge in the changes of economic systems of societies in the framework of his historic framework. In Marx’s view, in each economic system, the evolution of production tool makes contrast between evolved

production tool and dominant production relations that finally introduces production method and new economic system as the result of the contrast. In fact, the introduction his economic system of “scientific socialism” is based on his belief of the development of science and knowledge growth and its application in industry. In the twentieth century, Schumpeter’s views are suggested. He considered the role of invention and innovation in the economic dynamism and introduces it as the basis of entrepreneurship and economic change. In the following, Schumpeter’s followers including Galbright, Goodwin and Hirschman with more work in this regard heavily emphasize the contribution and role of knowledge, innovations and inventions in the trend of growth and development in their theories. In the early twentieth century, neoclassical economists regarded technical progress as a function of the application of science and knowledge in production tool. In this regard, Solo’s growth model in the 1950s can be mentioned in which technical coefficient as the representative of technology level is placed in the function of production along with the two main factors of production namely manpower and capital. Generally, in the 1950 and 1960s in the theories of economic growth and development, the role of human capital and investing in it is emphasized so that Gary Becker analyzes the importance of training and research in the growth of human capital and improvement of economic efficiency. Since 1980s, economists like Romer and Grossman have attempted to study the role of knowledge and technology in economic productivity and growth as one of the most important factors by presenting new theories of economic growth. Thus, it can be stated that knowledge has always been suggested as an important and effective factor in all theories of growth and development, but before 1980s, the effectiveness of knowledge on the trend of economic progress was investigated through different channels such as production tool, human capital and technology. In the present age, the terms KBE and KE, which are suggested and coined by OECD indicate the emphasis on the role of knowledge and technology in the trend of economic development. Therefore, it can be concluded that in KBE, knowledge is regarded more important qualitatively and quantitatively [2].

#### **Pillars of KBE**

The World Bank considers four main pillars for KBE as follows:

##### **1- Training and developing human resource**

It states that to reach a productive, publishing and absorbing society and use knowledge effectively, expert, innovative and creative individuals are needed that in a general classification, it refers to the cases of adults’ literacy rate (over 15 years old), registration rate at the second education level (high school) and registration rate at the third education level (higher education).

##### **2- Efficient system of innovation and invention**

It refers to enterprises, universities, research centers, counsellors and other organizations that benefit from the increasing resources of knowledge, adapt and adjust them based on their local needs that the number of questions in research and development activities, a capitation patent for one million people and the number of scientific papers and journal for one million people are taken into account.

##### **3- Informational and communicational infrastructure**

It facilitates communicational and informational processes in the path of acquiring and publishing knowledge. In this path, it refers to cases such as the number of telephone out of one thousand people, the number of computer out of one thousand people, and rate of using the Internet out of one thousand.

##### **4- Economic regimes and institutional and motivational system**

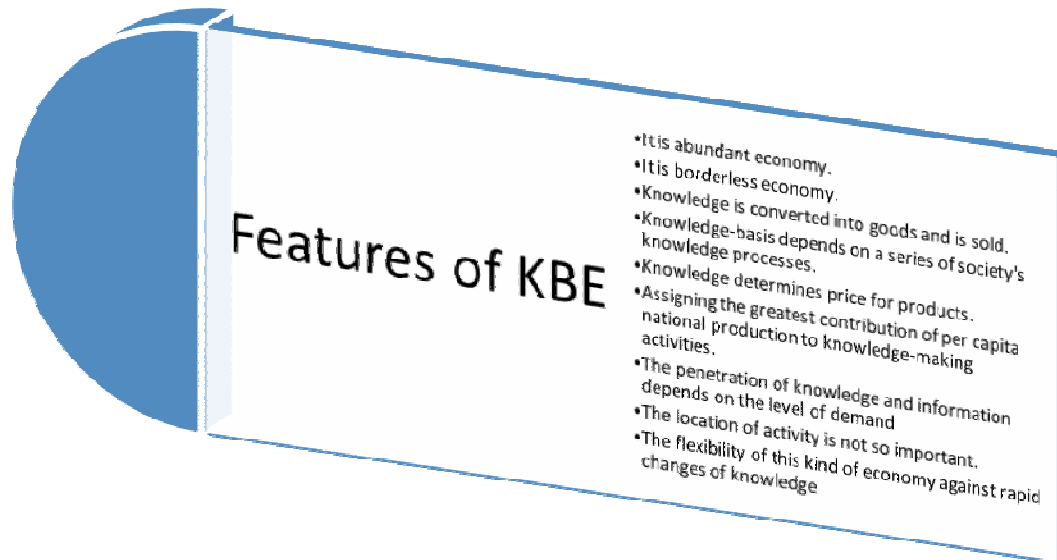
It provides necessary motivations to use knowledge appropriately and finally manifest creation and entrepreneurship in countries. In this case, tariff and non-tariff barriers, laws and regulation and quality of order can be mentioned.

#### **Preconditions and Features of KBE**

Training and investment in human capital, government’s supportive policies, ITC, existence of a suitable social, political, legal environment for investment, production and commerce are among the prerequisite of KBE [3]. In more detailed form, it can be mentioned that training and investment in KBE are absolutely necessary and among the priorities of this kind of economy and without them, KBE is unsustainable. The role of government’s policies in this kind of economy is extremely highlighted, because it plays a crucial role in creating, reinforcing and developing the interaction between government, university and industry. On the other hand, ITC is among the requirements of KBE that its infrastructure and update in this field also should be taken into consideration resulting in reducing expenditure and facilitating accessibility to a more comprehensive item of information. Finally, it can be expressed that all the mentioned cases require social, economic, political and

legal frameworks, because a prepared environment provides the background for the manifestation of creativity and innovations.

Figure 3 can be referred to show the features of KBE.



**Figure 3.** Features of KBE

#### **Evaluation Tools of KBE**

In traditional economy, indices such as GDP, employment, total production, total consumption, investment and other indices are employed to analyze the performance of domestic and foreign economy, but these indices have weaknesses in measuring KBE so that international institutes and science and research centers define other indices to measure KBE. The indices include HDI, OECD, KAM, ISI and APEC. It should be noted that KAM is considered to be the most complete and comprehensive method among all evaluation methods of KE that is a combination of all other indices and methods [4].

#### **Programs of the Islamic Republic of Iran and KBE**

With the analysis of the programs of the Islamic Republic of Iran, it is observed that in the first and second development programs, KBE as well as total productivity of production factors were suggested covertly so that among all the components of KE, only research components were suggested. The same trend continued in the third plan of development and only a number of other components were suggested. At that time, the country was ranked 18 among 24 countries of region, but with presenting the country's 20-Year perspective document, KBE was clearly suggested and long-term strategies are displayed to develop the country along with referring to society's enjoyment of health, welfare, food security, social security, equal opportunities, and appropriate distribution of income. At the beginning of implementing the 20-Year perspective document (the beginning of the fourth development program- 2001) the status of Iran's KE promoted to the rank 17 in the region. When the importance of KBE in the perspective document is manifested that the article 3 of the document implicitly mentions the country's main strategy as knowledge-based development. In addition, the article 7 of the mentioned document refers to the issue that Iran, in the path of KBE, should compete with the southeast countries of Asia and take the lead over them in 20 years. In the direction of keeping pace with the perspective document and development path of Iran's KBE. The fourth development program was implemented and the total productive of production factors was defined as an objective so that the fourth chapter of this program was named "knowledge-based development". At this time, Iran's status of KBE ascended 10 steps and reached the sixth rank of the region. In implementing the fifth development program, the objective of KBE is continued so that the second chapter of the program is named "science and technology" indicating the importance of science and technology in the program. Among the objectives of the fifth program is that active knowledge-based companies will be increased from 3000 to 20000. Furthermore, according to the objectives of the 20-Year perspective document in 2025, the number should reach 50000 companies, but what is not evident is taken measures in providing the background, conditions and infrastructures to achieve KBE in the future, because identifying KBE requires its performance measurement so that its movement and ability could be measured compared to the countries of the region.

**Table 1.** Information of the estimation index of Iran’s knowledge

Variables	Iran
GDP of annual growth	7.03
HDI	4.41
Tariff and non-tariff barriers	0.63
Quality of regulations	0.34
Role of law	1.99
Amount received for royalty and license cost (dollar to population)	n/a
Number of scientific and engineering paper in exchange for one million people	5.83
Granted patent by USPTO in one million people	3.29
Adults’ literacy rate	3.15
Registration rate at the second level of education	3.33
Registration rate at the third level of education	4.93
Total capitacion of telephone for 1000 people	4.52
Computer capitacion for 1000 people	5.77
The Internet-users for 1000 people	6.64

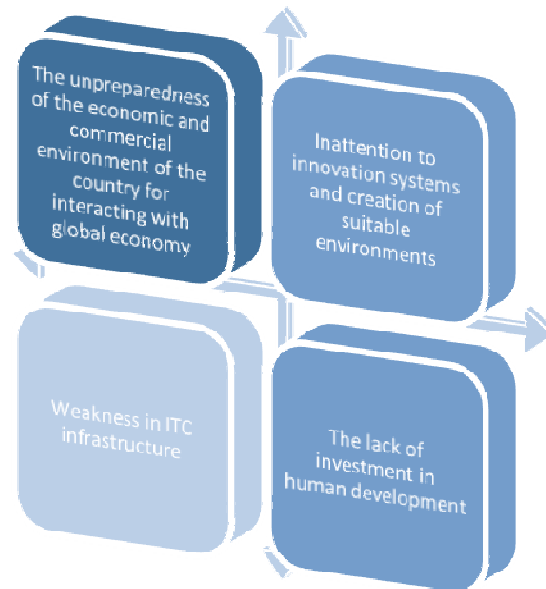
Source: the World Bank

By a simple analysis in this form, it can be inferred that four variable shave obtained higher than 5 among the variables and the simple mean of these fourteen variables is lower than 5 indicating high imbalance in the variables. According to the data, we realize that the status of tariff and non-tariff barriers as well as quality of regulations and role of law is extremely bad and undesirable. Literacy rate is also low. Concerning the use of telephone in relation to international standards, we are not at a desirable level. Finally, according to the data, it can be mentioned that the pillars of KBE are not still provided.

**Table 2.** Value added of knowledge and technology-based industries of Iran (1985-2007)

1985	1990	1995	2000	2005	2007
5423	5792	6933	10170	29422	44078

Thus, according to the data of the above indices, the challenge of KBE in our country can be showed as follows:



**Figure 4.** Challenges of suggested KBE in Iran

**Iran’s International Proportion of KBE**

According to the statistics of the World Bank [5], the export level of knowledge-based products in 2011 in the whole world has been more than \$1.933 trillion. In the same year, Iran’s export level of knowledge-based product has been only \$652 million. Although in 2012, the level of its export reached \$900 million, Iran’s proportion of this profitable market has been only 0.03%. In this direction in 2012, our country was ranked 96

among 146 countries in terms of KBE, which was analyzed by the World Bank. Generally, the rank of our country and export level of KBE products indicate that although in recent years, we observe different fields of science in the country and their export of products, the export of these products is a small proportion of global economy. Therefore, analyzing the status of the four aspects of KBE, it would be determined that although Iran is at an average level in terms of education, innovation and ITC infrastructures, it is in undesirable conditions in terms of institutional and motivational regime. Maybe, it can be mentioned that theoretical and scientific knowledge has not the ability to be converted into applied and productive knowledge. However, Iran in 2012 has gained the first rank in reliable researches in the region by presenting 37000 papers. In the same year, its ranks in terms of producing reliable scientific papers has been 17 among 225 countries, but these research plans have been unable to establish relations with the country's economic and industry sectors.

**Table 3.** Statistics of the World Bank of the export level of knowledge-based products from 2005 to 2011 in the world

Year	Export level (dollar)
2005	1588130027297
2006	1825303080609
2007	1766929090141
2008	1840595181210
2009	1572543337386
2010	1778380150242
2011	1933747147766

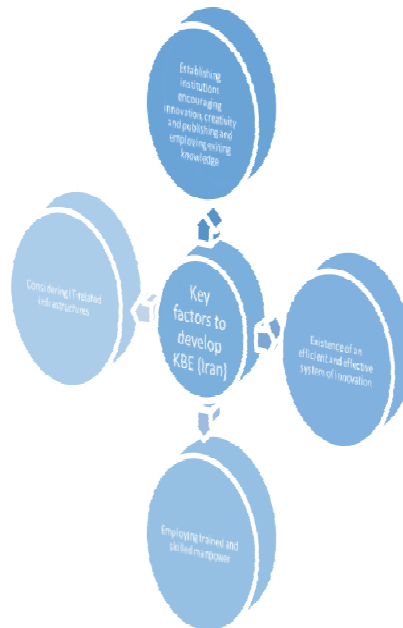
**Table 4.** Export of knowledge-based product of Iran (2010-2012)

2010	2011	2012
584312861	652571090	900000000

**Table 5.** Status of Iran's relative progress in terms of KBE from 1995 to 2010 in the region (24 countries)

	1995	2000	2005	2010
Index	0.0850	0.0876	0.1468	0.1626
Rank	18	17	7	6

According to the formal statistics, at present, 3000 knowledge-based companies and more than 30 Science and Technology Parks and 99 incubators are active in Iran. Although in 2014, 1 trillion tomans of the government's facilities was assigned to knowledge-based companies and 700 billion tomans was considered as the budget of knowledge-based in the budget of the year 2014, these measures are at low level compared to the international standards. This issue suggests the necessity of regarding key factors to develop KBE. Maybe, the factors summarily can be observed in the below diagram.



**Figure 5.** Key factors affecting KBE

## CONCLUSION

At the present age, one of the most important issues in the science of economy is KBE, which is manifested from the relation between intense competition and rapid changes based on the accelerated growth of science, knowledge and technology and consequently the appearance modern phenomena such as globalization. From the past to the present, the theoreticians of economic development have always regarded knowledge as an endogenic factor in countries' economic growth, but what is the main motive of economic growth and development in KBE is the production, distribution and application of knowledge in all economic activities requiring training and investment in human capital, government's supportive policies, ITC, existence of a suitable social, political, legal environment for investment, production and commerce are among the prerequisite of KBE so that necessary conditions are provided for invention and innovation and finally ideas are converted into new products. Thus, in the present paper, the concept of KBE and the suggested theories were studied in brief and the pillars and features of this kind of economy were discussed. In addition, the country's development programs were considered. According to the published statistics, it was inferred that implementing the Third Program in the early 2000s, promoted Iran's rank of KBE to 17 among the countries of the region at the beginning of implementing the 20-Year perspective document (the beginning of the Fourth Development Program in 2001) with respect to the rank 18 of Iran in the region in 2000 (the beginning of the third development Program). The status of Iran's KBE ascended 10 steps and reached the sixth rank of the region by implementing the Fourth Development Program [6]. Although, Iran has a considerable distance to the average international level, taking a huge step in achieving the objective of the perspective document can be expected by solving infrastructural weaknesses and commercializing the results of scholars' researches as well as developing investment of the government and private sectors. Certainly, making this long distance shorter requires accurate objective-formulating and planning so that the following recommendations are presented:

- 1- Considering and improving international relations to absorb foreign investment and consequently absorbing advanced technologies
- 2- Increasing the proportion of exporting advanced technology and IT among exporting all goods and industrial services
- 3- Developing relations between industry and university and consequently commercializing the results of scholars' researches
- 4- Increasing budget and credits to the sector of high education researches
- 5- Improvement and development in financial security system for creators and innovators and consequently developing entrepreneurship and innovation in KBE.

## REFERENCES

1. Adam Smith (1776). *An Inquiry into the Nature and Causes of the Wealth of Nations*. book Publisher/Edition. London: Methuen & Co., Ltd. Pub. Date. 1904.
2. Nazeman, H. & Eslamifard, A. (2010). KBE and sustainable economic, *Knowledge and Development*, 18(33).
3. Memarnezhad, A. (2005). KBE: requirements, indices, Iran's position, challenges and solutions, *Economy of Modern commerce*, 1.
4. Abu Noori et al., (2013). The role analysis of the components of KBE in total productivity of production factors, *Macroeconomic*, 8(16).
5. World Bank, *World Development Report- Knowledge for Development*, New York: Oxford University Press, 1998/99.
6. Entezari, Y. & Mahjoob, H. (2013). The development analysis of KBE based on the document of 2025 perspective, *Development Knowledge*, 17(33).
7. Behboodi, D. & Amiri, B. (2010). *The long-term relation between KBE and economic growth in Iran*, *Policy of Science and Technology*, 2(18).
8. Shahnazi, R. (2012). *Effective factors on the production of industries using high technology in KBE*, *Parks and Incubators*, 9(33).
9. Law of the Fourth Economic, Social and Cultural Program of the Islamic Republic of Iran. WWW.RC.MAJLIS.IR
10. Law of the Fifth Economic, Social and Cultural Program of the Islamic Republic of Iran. WWW.RC.MAJLIS.IR
11. Mousavi Jahromi, Y. (2009). *Economic development and planning*, Sixth Edition, Payame Noor University.
12. World Bank, (CD WD12010).