

Economic Modernization in Vietnam From Industrialization to Innovation Stage

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Abstract. The paper explores the concept of modernization which is carried out in Vietnam from the middle of the 1990's, its main tasks, methods and stages, influence of the experience of new industrial states of East Asia. Forms and results of this industrialization are revealed; features of this process in SRV in comparison with other known models are noted. Signs and degree of a maturity of an innovative component in the Vietnamese society, problems and transition prospects to "a knowledge based economy" are defined. New spheres, tasks, indicators of economic growth in current decade are characterized. In conclusion it is stressed that despite successes of "catching-up development" Vietnam continues to lag behind the advanced countries of the region and aspires to accelerate modernization process by changing character, rates and realms of development. Assuming world financial crisis in 2008-2011 as a driver to cardinally change main trends of progress, balance of forces and a situation in the world, the author tries to estimate, what place Vietnam will occupy in the post-crisis era. Such possibility depends decisively on how fast and successfully the country will finish the process of industrialization and will pass to an innovative stage of development.

Keywords: Vietnam, modernization and industrialization, innovative system, information technologies (IT), scientific and technical progress.

1. Trends and patterns of modernization process in Vietnam

Overall, at the present time we have evidence of two trends that powerfully alter the logic of social progress, namely economic globalization and the development of innovative economy. The first industrial revolution (i.e. the transition from an

agricultural economy to a manufacture) and post-industrial revolution (in the form of transition to innovative economy) simultaneously take place today in different parts of the world. The first covers a large part of humanity or 75% according to A. Toffler estimation, and the second one covers only 15-20%⁽¹⁾.

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⁽¹⁾ A.Toffler, *The Third Wave*. Thanh nien Publ., Hanoi, 2002, p.116.

In Vietnam the policy of industrialization and modernization expresses official concept of development and is similar to the theoretical approach proposed by China. Firstly, the economy to be modernized has to overcome the development stage peculiar to the patriarchal and traditional agricultural society and possess with some industrial potential. Modernization is divided into a phase of industrial economy erection and of the information system development (the so called “knowledge based economy”)⁽²⁾.

Secondly, within these phases a series of successive stages of modernization is allocated, i.e. the initial stage, development, maturity and transition (to the next phase). Vietnam passes the process of industrial development and the transition to the first phase of the “knowledge based economy. China, which overcomes Vietnam for about 10-15 years, has shown an example of both types modernization and passed through a significant part of this path. Therefore we can apply for Vietnam too the concept of “comprehensive modernization” introduced by Chinese scholars that joins the first and the second phase together.

Theory stresses three possible ways of industrialization based movement to the modernized future. The first one is typical for inertial by nature import substitution

technological development. This way focuses on traditional sector which processes raw materials. In this case the technological gap with the West is constrained by import of ready-made technologies.

The second way, presenting the “catch-up development”, helps to achieve a local technological competitiveness and fast growth. It implies the capacity of its own economic potential enlarging and taking advantage in the most competitive areas.

Third, the most ambitious approach is to achieve leadership in leading scientific and technical sectors, and fundamental research. This way requires a significant financial investment and organizational efforts of the government to modernize the R&D sector and basic science, the concentration of resources and human capital on the cutting-edge areas of scientific and technical progress. It is clear that Vietnam cannot afford such tasks for today. While hasn't built fifth technological generation the country is impossible to assess the sixth one.

Vietnam has to use its limited funds and resources for prompting the rise of industry and agriculture to meet the urgent needs of society. It exports mainly raw materials and agricultural products, applies production cooperation with more developed countries, which exploit its cheap labor, and imports goods with high added value. This policy has limited attention to human development, science and technology, knowledge-intensive sectors of the economy in the past 25 years of reforms and renovation (1986-2010).

Hence, the modernization process in Vietnam is progressing only in the first two forms mentioned above. At starting stage the country used for a maximum import substitution to strengthen the foundations of

⁽²⁾ According to Chinese researchers, in China the “first modernization” was already accomplished in 1999 by merely 74% (64-th position in global rating), this is significantly higher than the average low-income countries - 62%. By the proceeding of “second modernization” China was ranked 56-th, only slightly behind the average. Only 24 countries started to implement the second modernization, of which 12 are already out of the initial stage of development. See details in: V.Ja. Portyakov, 2009, *China: a universal model of modernization*, World Economy and International Relations (Moscow), No. 8, p.76.

industrial production and thus provide jobs for people and essential goods, to raise the technological level of the economy. Then it created competitive export oriented industries, including high-tech clusters. Thus the Vietnamese government combined indoor and outdoor models of industrialization - import substitution and export-oriented. As we know by historical experience, in the long term run the second one brings more promising results. That's why Vietnam preferred the second in the end of 2000's.

Form, features and results of industrialization

During "Doi moi" process the approach to industrialization known in socialist countries was found largely outdated. Vietnam had to develop a new concept and overcome previously widespread view of it as a process that is not directly associated with the formation of market relations and institutions⁽³⁾.

Until the late 1980's Vietnam leadership complied with the socialist model of industrialization. Its core components were the development of heavy industries in public sector by applying command methods without taking into consideration the cost-effectiveness and availability of financial resources for the sake of sovereignty. Capitalist industrialization is based on a different principle: the development of any industry and the manufacture of any product is determined by an independent contractor, namely by the market. This ensures the inflow of investment into industries with comparative advantages and international competitiveness. The government

only provides the necessary conditions and institutions for the operation of key actors of the economy and efficient allocation of public resources.

By starting "Doi moi" policy the Vietnam leaders partly changed the former approach, but were not decisive enough to fully apply the new one. They assume that market forces by themselves are not an institutional guarantee for the success of industrialization and reforms. The CPV is a supporter of active intervention into economic activity and effective state assistance to it in order to overcome the shortcomings and failures of the market. Desire to use the regulatory role of the state aimed at transformation of the economy has caused a combination of these approaches. It is reflected in the fact that industrialization in Vietnam has two components, i.e. technical modernization, and formation of a large scale industrial manufacture (material and technical aspects) together with development of a market economy (institutional aspect).

The third component is integration into the world economy. This means the official refusal of the CPV from the concept of building up a self-sustaining economy with all necessary kinds of production that have prevailed over half a century. Vietnam seeks to develop some branches in compliance with international division of labor trying to make it better than other countries.

Following the East Asian model of economy rise and transformation as a whole, the Vietnam government largely copies its methods of industrialization. As we know, the leaders of Japan, South Korea and Taiwan placed some industries under priorities for investment, and executed a pretty strong intervention in the market (for example, Korean government selected heavy and chemical industries, all three countries prioritized capital market). The experience of these countries

⁽³⁾ According to Vietnamese economists the country has not formulated a complete, clear, uniform concept of industrialization till the end of the 2000's. See in: Do Hoai Nam – Tran Dinh Thien, 2009, *Models of socialist-oriented industrialization and modernization in Vietnam*. Social Publishing House, Hanoi, p.15-16.

shows that they succeeded to support growth through “market regulation” and to create incentives for catching-up development.

Modern political economy calls governmental stimulation of structural reforms with administrative levers as industrial policy or “the choice of competition winner”. When carrying out this policy the industry as a whole and its individual sectors demonstrate exceptional growth for some period as happened in Vietnam. The breakthrough is usually achieved due to industrial monopoly, namely through the activities of public enterprises or large private corporations such as chaebol in South Korea. In Vietnam, the mentioned forms are unified in the name of state corporations. However, the monopolization undermines market mechanisms and gives rise to conflict of interest between the state and private business.

Today Vietnam is limited in using of traditional instruments of industrial policy, which helped socialist states and East Asian countries in the 1950-1980's. The new rules of the WTO regarding import and export, foreign investment, intellectual property, competition and so on limited the choice of measures to ensure the growth of the industry needed to increase economic competitiveness. Instead of the previous measures Vietnam authorities have to find others, not inconsistent with WTO rules. This policy includes the hard infrastructure building, training of local personnel, technological innovation, attracting of FDI and multinationals, increasing the competitiveness of domestic products, etc.⁽⁴⁾ However, not all of these measures are equally useful.

Vietnam leadership realizes both huge economic benefits of cooperation with multinationals and serious troubles arising from their intervention. Small and medium-size national companies often go bankrupt while

⁽⁴⁾ See in: *Models of industrialization and modernization*. Op. cit., p.43-45.

competing with TNC. Multinationals created a network of branches all over the world, depending on the parent companies, and thus involve developing countries in the sphere of transnational capital domination⁽⁵⁾. The greater the presence of TNCs, the greater is the risk of dependence of sovereign countries' economic policies to their interests.

Encountering new difficulties Vietnam as a successor of NIS uses the advantages of a country that “moves behind”. It has access to external sources of industrialization (capital markets, technologies, human resources) and the objective conditions for the conversion of options to reduce its duration into reality, thus avoiding repeat of its predecessors mistakes⁽⁶⁾. This approach allows to omit “unnecessary” stages and to avoid round way efforts, helps to rapidly change economic structure, develop advanced technologies, and eventually catch up with the more advanced countries as NIS, China and India previously done.

The reducing of the industrialization delay is achievable in two ways. First is increase of the rate of transition from agrarian to industrial economy, the second is overcome of the logic of sequential steps and structural breaks. Vietnam, like other countries that want to accelerate industrialization, seeks to combine both of these methods, but the first is still prevalent in most cases⁽⁷⁾.

Vietnamese industry has performed high dynamic in the period of market transformation. In 1991-2007 (prior to the global crisis) it has grown at constant prices on average by 10.8% per year or 1.5 times faster than GDP (7.2%). In 2008-2010 growth rate fell to 6-8%, however,

⁽⁵⁾ See in: Dang Huu (Editor-in-chief), *Developing a knowledge based economy to speed up industrialization and modernization process*, National Political Publishing House, Hanoi, 2005, p.131.

⁽⁶⁾ See in: A.Gerschenkron, *Economic Backwardness in Historical Perspective*. Cambridge, 1962.

⁽⁷⁾ See: *Models of industrialization and modernization*. Op. cit., p.48.

industry ensured up to half of the increase in gross domestic product and surpassed other sectors. As a result the contribution of industry and construction into GDP rose from 23 to 42% during 20 years, while the agriculture and allied sectors declined accordingly (Figure 1). Consequently the structure of Vietnam's

economy transformed from agrarian to industrial-agrarian one and is quickly becoming mostly industrial. In a narrow sense the increase of manufacture share in GDP and reduction of agriculture means the industrialization itself with a respect to backward countries.

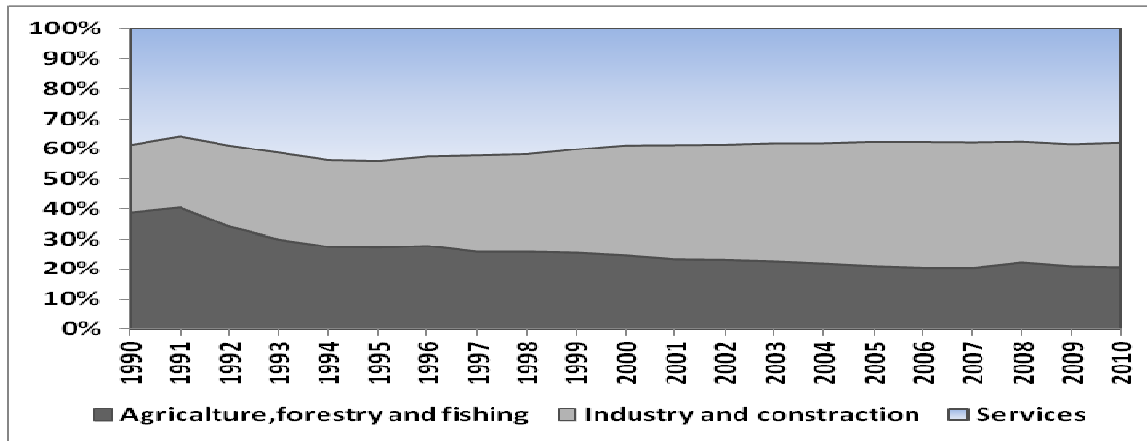


Figure 1: Structure of Vietnam's GDP by economic sectors (at current prices).

Source: <http://www.gso.gov.vn/default.aspx?tabid=388&idmid=3&ItemID=12961>

Formation of manufacturing sector has become the leading trend in the industry: its share rose from 12 to 20% of GDP and from 70 to 85% in the industry itself. The contribution of this advanced sector to export increased from 52 to 68% in 1995-2007⁽⁸⁾. Industrial growth has accelerated changes in the structure of rural economy in the spirit of industrialization and gave bold increase in processed agricultural, forestry and fishery products, especially consumer goods, in per capita income and living standards of the people in the city and countryside⁽⁹⁾. This achievement significantly

raised the level of national industrial development.

Along with significant progress of industrialization Vietnam faced with a number of negative trends and problems.

(1) The development was mainly focused on natural resources - physical and human one that form core resources of agrarian economy, i.e. land and labor (unskilled). In this way the country pushed the growth of GDP and export industries with comparative advantages (mining, agriculture, forestry, marine, processing industry using raw materials and labor). The third source of growth is the capital; its effect and value increase although transfer of land and labor into commodity-value terms is

⁽⁸⁾ Nguyen Thi Huong, *Sustainable Development of Industry in Vietnam: Achievements, Limitations and Policy Suggestions*, Vietnam's Socio-Economic Development, No. 59, p.15-16; GSO, 2011, *Statistical Yearbook of Vietnam 2010*, Statistical Publ. House, Hanoi, 2009, p.426.

⁽⁹⁾ Vietnam's per capita GDP rose from USD 158 to 1,200 in 1991-2010 rating it at USD 3,000 by PPP. By this indicator Vietnam entered the lower layer of the group of

countries with middle income. See in: *World Development Indicators 2009*, p. 40, 2011, p.233; CIEM-NUS. Porter M.E. ed., 2010, *Vietnam Competitiveness Report 2010*. Hanoi, p.28.

not yet completed. Consequently the industrialization in Vietnam is realized according to traditional, classically socialist recipes for the most part.

(2) Such trends emphasized an extensive way of development. Under this way the priority of structural reform is given to the development of industries immediately ready for rapid expansion of production but not to the increase of technical equipment, quality, efficiency and productivity. Of course, the higher growth rates allowed Vietnam to increase production and economic potential. However, such development does not meet modern requirements of competing in an open global economy.

(3) Some import substitution industries (including metals, cement, paper, chemical fertilizers, sugar manufacture etc.) turned to be ineffective. The policy of protection (applying high import tariffs in foreign trade) and closed doors, which has been granted for them for a long time and in large-scale, caused negative consequences. Let's note among them a waste of public money and time, strengthening of protectionist mechanisms and nepotism ("nhóm lợi ích"), a priority to inward oriented development.

(4) The distortions in investment policy became more and more obvious. Emphasis was placed on government funding of large projects in heavy industry while labor-intensive projects were underestimated. There appeared a syndrome of building of sea and air ports, industrial and export processing zones. Both directions scarcely used private investment (while private business cannot grow due to contracting and mediation only), were not subject to market regulation with the aim of economic restructuring and did not help to create new jobs. These characteristics suggest

that comparative advantages and market competition are not applied in plain force in the process of industrialization in Vietnam.

(5) Upgrading of infrastructure lags behind the development of the economy, although it affects the acceleration of growth and competitiveness. The state had to drastically expand core infrastructure (erection of roads, ports, and airlines), producing of electricity, construction materials. In the same time the government had to enforce modern infrastructure (telecommunication, banking and financial services), including industrial and urban zone. According to foreign donors and investors the possibility to solve these problems decisively influences prospects of Vietnamese economy after its entry to the WTO⁽¹⁰⁾.

(6) The processes of industrialization and urbanization appeared to be separated from each other, and the state has not yet managed to harmonize both processes that cause a delay of modernization from industrialization. The emphasis on rapid economic growth has led to the formation of zones with high concentration of population and industry in the absence of adequate plans for these areas development. This has accentuated economic and social disparities, environmental and other problems that need fast solutions.

(7) Changes in economic structure were not accompanied by adequate restructuring of the labor force, since that need was not recognized as important⁽¹¹⁾. In general this situation was

⁽¹⁰⁾ The most serious of them are the transport and supply of electricity. For example, to maintain high dynamics of the open economy the rate of seaports building should be 2-3 times higher than the growth of GDP, but in Vietnam the gap is only 1.2-1.5 times. Shortage of electricity has increased from 10 to 20%. See in: *Models of industrialization and modernization*. Op. cit., p.154.

⁽¹¹⁾ The employment in the primary sector fell from 72.7 to 48.7% in 1990-2000's, while in the secondary it rose from 11.3 to 21.7%, and in the tertiary from 15.7 to 29.6%, see in: *Statistical Yearbook of Vietnam 2010*, p.102-103; Nguyen Van Nam - Tran The Dat (Co-editors),

caused by the nature of development strategy that heavily depended on sectoral interests. As a result, labor is a key factor playing crucial role in Vietnamese economy was underestimated. These failures in structural policy found their quantitative expression (a surplus of work force together with deficit of jobs), and, more importantly, the qualitative one (lack of qualified specialists and skilled workers).

Overall, in spite of huge investment in industrialization the industry remains relatively weak. The share of high-quality and high-tech products is growing slowly. Having a diversified structure Vietnam's industry possesses backward technology, poorly uses advanced knowledge, lacks of competitiveness. It has uneven geographical allocation and fast increasing dependence on imported raw materials.

Because of these errors and problems the industrialization in Vietnam has not yet been completed. This estimate is expressed by leading scholars of national economy⁽¹²⁾. It is obviously shared by the CPV itself, because XI Party congress set the task to transform Vietnam into industrialized country by the year 2020.

Thus, increasing public investment and reliance on cheap labor in the course of industrialization began to exert the opposite effect, which was reflected in the low quality of the economy, in a new threat of natural resources exhaustion and environmental degradation⁽¹³⁾. The very use of natural

comparative advantages came to the limit due to the fact that cheap natural resources (especially raw materials) and labor are becoming increasingly scarce and costly. Vietnam can continue such development for some time but only with the aim to find a new model, which could raise its competitiveness⁽¹⁴⁾.

Depletion of raw materials and export based sources of development was completed by reduction of demographic activity and share of the workforce in Vietnamese population. Loss of previous comparative advantages like the core of catch-up development pushes the country to build a knowledge based economy.

2. Policies and options of transition to innovative economy

The transition to innovative economy of developed countries made clear its basic characteristics. Production content of "knowledge based economy" is defined by high technologies and skilled labor, at the same time the value of capital, particularly of land and simple labor, falls. Knowledge and high technologies become the new productive forces. Of course, in the most part of developing countries the scientific and technological lag only increases. Based on the fact that new knowledge is created and controlled by rich countries and are difficult to access, the Vietnam's leaders want to join innovative segments of the world economy through cooperation mechanisms.

In addition, all national human resources capable to promote new knowledge and

Speed and quality of economic growth in Vietnam, Publishing House of the National Economics University, Hanoi, 2006, p. 94.

⁽¹²⁾ See details in: Ohno K. – Nguyen Van Thuong (Co-editor), *Strengthening Vietnam's industrialization strategy*, Political Theory Publishing House, Hanoi, 2005; Depice D. et al, 2004, *History or policy: Why don't Northern provinces grow faster*. Hanoi People's Committee.

⁽¹³⁾ According to the UNDP calculations resource depletion in Vietnam is now quite small (7.2% in 2009), lagging far "behind" the developed countries of ASEAN

and China (66%). See in: UNDP, Human Development Report 2011, *Sustainability and Equity: A Better Future for All*. Table 6, p.147-148.

⁽¹⁴⁾ See in: Nguyen Lu (Translator), *War and inflation in Vietnam*, Hanoi, 2009, pg. 224-226.

technologies are developing. To do this, the focus of investment is transferred from physical factors to virtual one, i.e. the development of human capital is stimulated. In particular, the CPV recognized the need to release funds by limiting the construction of capital facilities and direct them to the creation of new industries and jobs. Development of science and education is becoming a priority⁽¹⁵⁾. Thus, the strategy of innovative development and modernization in Vietnam tries to shift from extensive to intensive development model.

The policy aims at creating dynamic advantages on the base of quality human resources instead of previous static advantages. But it is not yet determined, in which segments the innovation are accessible, as the country poorly participates in global production supply chains. But in a general the relevant course was adopted and a proper focuses was made on the development of specific high-tech industries as new fundamentals of national economy.

Practice confirms that Vietnam can solve this problem quickly. For example, some recently created branches of the economy such as telecommunications, energy generation, microelectronics and others, have reached the level of advanced countries in the region. The fact that about 10,000 of 'Việt kiều' are working in IT companies in the U.S. Silicon Valley and many persons occupy leading positions, confirm excellent abilities of Vietnamese.

Some scientists consider it premature to set the task of creating an innovative economy in Vietnam⁽¹⁶⁾. They note that "old" methods of acquisition and development of foreign technologies are still relevant, and can be more

efficient in economic terms, especially in terms of cost. In their view, Vietnam is not yet ripe for the development of high-tech, and it takes a lot of time.

However, the country leadership began to develop and validate the concept of erasing an innovative economy. This was first the CPV IX Congress (2001) drew attention to it and called the transition to the knowledge based economy as main task of the whole policy of industrialization and modernization. XI Party congress (2011) made a bid for intensive factors of growth and development of innovative economy in the period up to 2020⁽¹⁷⁾.

To address these challenges it deemed necessary to stimulate the application and perception of knowledge accumulated in the world, proliferation of local experience and know-how through comprehensive changes in economic, cultural and social spheres, creation of other institutional preconditions. And the transition to new economy is proposed not in the form of immediate exploration of high technologies and advanced industry structure, but through the application of knowledge to accelerate development⁽¹⁸⁾.

Given the experience of foreign countries entered into next stage, the CPV made some conclusions to be followed by Vietnam under this new strategy. First, the country will "move at two speeds", which can allow to combine consistency in implementing traditional features with breakthroughs to modern knowledge and technologies. It is understood that new knowledge has to help maximize the use of excessive labor and land resources, technologies and manufacturing capacity. This

⁽¹⁵⁾ See in: *Models of industrialization*. Op. cit., pg.63; *Knowledge-based economic development*. Op. cit., pg.290.

⁽¹⁶⁾ They point out that its contribution is overestimated even in the U.S., as shown by the Nobel laureate P.Krugman. See in: P.R. Krugman, *Pop-Internationalism*, Cambridge, London, 1999.

⁽¹⁷⁾ Materials of the XI Congress of the Communist Party of Vietnam, 2011 (in Russian), *CPV: Strategy for socio-economic development of the country in 2011-2020*. IFES RAS, Moscow, p.124-125.

⁽¹⁸⁾ See in: *Knowledge-based economic development*. Op. cit., p. 175-179, 230-231.

allows the development of individual industries and sectors that rely on high technologies to achieve the structural changes and create a “locomotive” that can drive the whole economy. Second task is to create basic system that meets the national peculiarities of technological innovation. Thus the focus on development of science and technology inside the country, especially in selected segments and areas, is combined with the potential of emigrant community (as did Taiwan, South Korea and Singapore).

Third, based on the fact that the man is determining factor of success, Vietnam embarked on creation of young academic generation, capable of thinking in new ways and of accomplishing most difficult duties. This policy gives paramount importance to education reform and the development of human capital. In particular, the current goal is to reach 75-th position in global ranking by Human Development Index – HDI (starting from 128-th position out of 184 countries in 2010) during one decade. It means that Vietnam has to overtake 45-50 countries whose ranking is higher for today⁽¹⁹⁾. As a result human capital is expected to grow by 1.5 times⁽²⁰⁾.

Fourth, the priority is given to form the foundations of information technology structure as the driving force of economic growth. It was decided to correct the bias in favor of communication technologies and develop the

system of e-governance in the broad sense. The government stresses a task of changing the culture of entrepreneurship too, because it is underdeveloped in Vietnam and, according to the experience of other countries, is usually created with great difficulty⁽²¹⁾.

Meanwhile the state innovation system in Vietnam is not yet created. The state did not establish an organic connection between science and technology on the one hand, and between production and business, on the other. Technological innovation in the economy is going slowly. That’s why Vietnam continues to significantly lag behind most countries in East Asia and other fast developing countries of the world on a number of indicators, including indicators of information development. Much of Vietnam low indexes were due to the following factors:

- Backwardness of infrastructure necessary for the effective application of modern science, techniques and technology;
- Prolonged informational isolation of Vietnamese population during and after the war;
- High tariffs and other barriers, low state investment in development of this sector in the 2000’s if not to mention an earlier period⁽²²⁾.

In comparison with high rates of information technologies diffusion in the world we can see that Vietnam has not yet reached the stage of innovative economy in the early XXI century. Relationships between industry and science remained weak. However, in the first decade of this century the pace of its development has been accelerated dramatically as evidenced by improving Vietnam’s position in the world rankings on information and communication technologies - ICT (Table 1, Figure 2).

⁽¹⁹⁾ For the purpose of social security it is also scheduled to realize the third millennium development goals (eight major) till 2015 or earlier. The hunger will be completely overcome, and the share of population living in poverty has to be reduced from 14% to 1-1.5%. See in: *Models of industrialization and modernization*, Op. cit., pg.243.

⁽²⁰⁾ This indicator reflects the overall quality of human resources. It is measured as follows: the working-age population, multiplied by the average duration of human education in years. The calculation of HDI also takes into account life expectancy and other factors. See in: *Models of industrialization*, Op. cit., p.239.

⁽²¹⁾ *Knowledge-based economic development*. Op. cit., p.202.

Table 1: Vietnam's position in global ranking of ICT development (ICI)

Period	Rank	ICT index
2008	91	2,76
2010	81	3,53

Source: International telecommunication union: Measuring the information society 2011. Geneva, 2011. P.13.

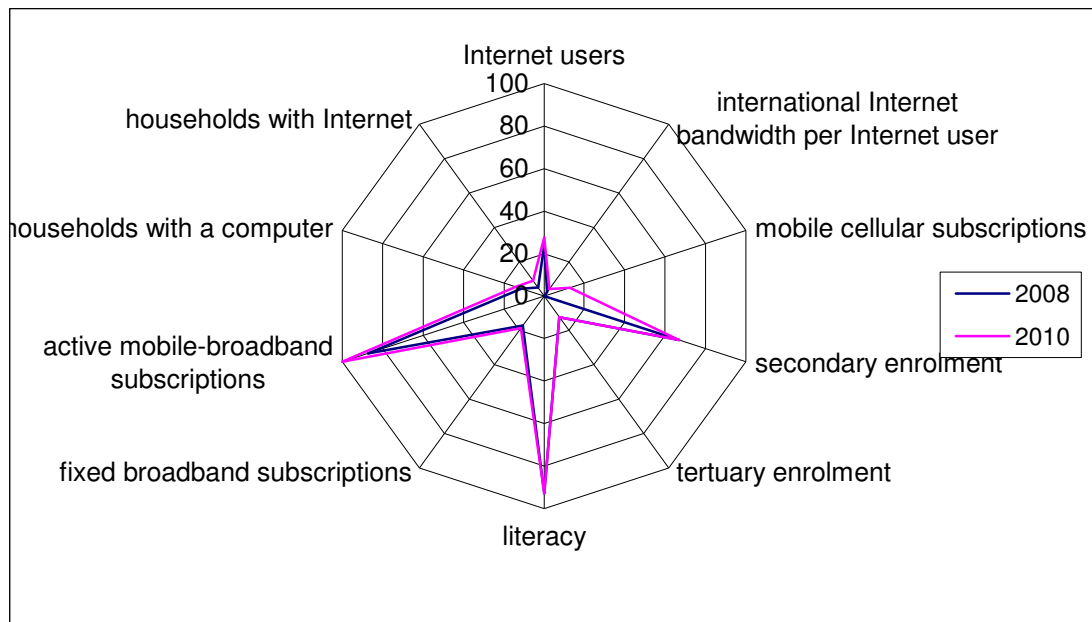


Figure 2: ICT development in Vietnam by key components from 2008 to 2010.

Source: International telecommunication union: Measuring the information society 2011. P.23⁽²²⁾

⁽²²⁾ Expenditure on ICT per capita increased in Vietnam over the period of 1992-2000 from USD 3 to 24. See in: V.M. Mazyrin, *Transition reforms in Vietnam (1986-2006): Main realms, dynamics and results* (in Russian), Klutch-S Publ., Moscow, 2007, p.316.

Data on the availability of conventional and new communication devices allow us to determine effects of information technologies' deployment in Vietnam. All cities and provinces accessed digital channels, the mobile phone and Internet structure was raised. Due to it a gap between Vietnam and more developed countries began quickly reducing. Consequently, the access of Vietnamese people, especially in big cities and urbanizing areas, to the global information and knowledge is improving fast. Although electronic services not widespread (1% of Internet users applied e-trade in early 2000's), changes are brewing. The increase in production and sales of modern equipment (computers, software, mobile phones, fiber optic cable, etc.) stimulated positive changes.

Overall public investment in science-technologies including IT and telecommunications reached 2% as a share of budget spending and the contribution of this sector increased to 7.6% of GDP in 2009. IT industry increased by 20% even in 2009 despite the global economic crisis (the cost of goods and services of this sector reached USD 6.26 billion). The task is to increase contribution of the ICT industry into GDP up to 10% in 2012.

The government issued a set of measures to overcome the technological gap and accelerate scientific and technological progress in Vietnam, create modern infrastructure for research, development and innovation. For example, it was initiated the formation of promising research consortia and other organizational structures in industry to carry out R&D for small and medium industrial enterprises that do not have their own scientific, technical and experimental base.

According to the "Plan of transformation Vietnam into the country with advanced information technologies in 2010-2020" (decision No. 1755/QĐ-TTg dated 22.09.2010)

government planned to raise USD 8.5 billion from the different sources for the development of information technologies in 2010-2020.

In accordance with this project in the next decade Vietnam will become an information-developed country, in which information and communication technologies play a role of leading sector of the economy. By 2020 Vietnam has to occupy in the field of information technology for about one million highly skilled professionals with 80% of them to be able to work in international environment. For comparison, in 2010 the IT sector employed about 226 thousand people, of which 121 thousand were engaged in the production of equipment, 64 thousand created software and 41 thousand worked in IT related fields.

The Government has adopted programs for workforce building in IT sector, such as "The plan of workforce development in information technology in Vietnam till 2020" (No. 05/2007/QĐ-BTTTT dated 26.10.2007) and "Master Plan for labor in information technologies by 2015 with an outlook till 2020" (No. 698/2009/QĐTTg dated 01.06.2009).

3. The revolution in telecommunication sector

This process is progressing rapidly in Vietnam, and thus the telecommunication industry provides an increasing contribution to the development of the country. According to the International Telecommunication Union, Vietnam is one of the leaders in technological modernization of telecommunications as well as the fastest growing telecommunication industry. The country overcomes quickly the gap in the field of information technologies. The annual growth rate of Internet, computer industry, telephony, especially mobile, reached 30-50% that is one of the highest in the world.

The density of a telephone lines at the middle of the 2000's counted 29 devices per 100 inhabitants, while total users number didn't exceed 24.4 mill, of which 67 % used mobile phones. Over the last 5 years indicators grew on the average twice, and in some segments of telecommunications it was even more fast.

In the Vietnamese market **mobile phone** penetration is among the highest in the world. The total number of subscribers surpassed 184 million⁽²³⁾. It is estimated that the level of mobile penetration in 2011 exceeded 200%.

According to experts such extreme rank can be explained by the fact that operators are reluctant to subtract from this figure a number of inactive seem-card with the aim not to reduce own market share. Number of active cards is estimated at about 116 million that makes real penetration lower of about 113% (ahead of many developing countries with an average level of 70%) and even most developed countries (Figure 3). According to estimates Vietnam ranked 8-th in the world in 2011 by the number of users (7-th in 2010).

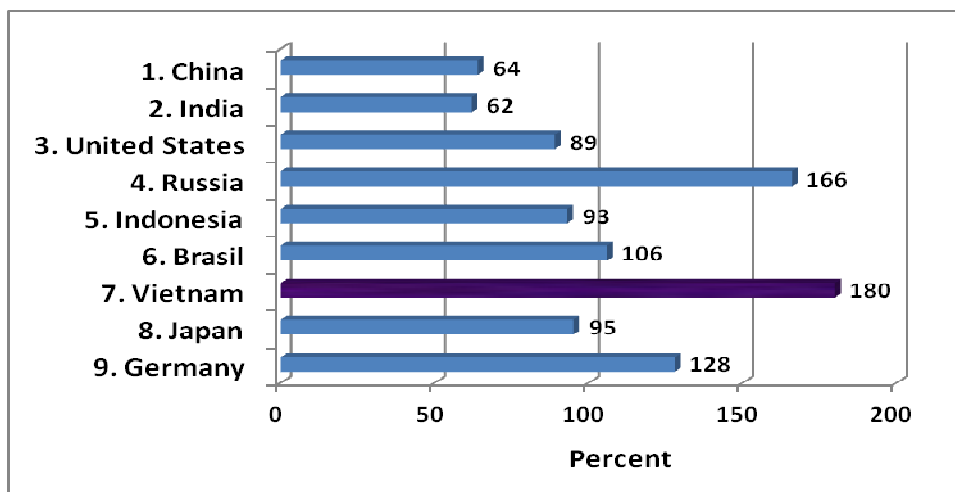


Figure 3: Ranking countries by mobile phone penetration in 2010.

Source: World Bank Development Indicators, 2010

However, the spread of fixed communication lines stopped in Vietnam: in November 2010 their coverage involved 16.4 million subscribers. In this area there was an increase of 27.4%, which reached a peak in May 2010 (20 million), and then began a steady decline.

It is expected that the average annual growth of the telecommunication market in Vietnam would be of 12%, and of the soft market will reach USD 3.3 billion by 2015.

The country has also built completely modernized infrastructure of communication based on advanced technologies. 3G and HSDPA networks have been deployed. Data transfer rate reached 7-14 Mbit /sec. Currently almost all provincial telephone stations are digitized and have connections with Hanoi, Danang and Ho Chi Minh City with a high frequency radio networks or fiber optic lines.

Development of technologies allows companies to provide new services. Services like video conference, meeting online, mobile TV, etc. are becoming popular in 2010-2011.

⁽²³⁾ OECD, *Review of innovation in South-East Asia Country profile of innovation: Vietnam*, OECD Directorate for science technology and industry, 2011.

Development of Vietnam telecom is promoted by the expansion of techno parks and high-tech parks. At the moment Saigon High Tech Park and Hanoi high-tech park are two of the major projects in this field in Vietnam. Danang Software Park in central Vietnam was designated a specialized area of IT.

Promising Vietnam's telecom market attracts many foreign companies. With this aim the country leadership Vietnam tries to create favorable conditions for foreign companies in the field of information technologies. The government enacted a separate provision, which regulates foreign investment in high-tech sectors of SRV. Its primary goal is to attract potential investors to the discovery and development of science intensive industries and research companies in Vietnam. According to the government estimates total foreign investment in this sector must attain USD 5 billion dollars by 2015.

The number of **Internet** users and subscribers is rapidly increasing in Vietnam too. According to Vietnam's Internet Information Center total number of users has increased from 3.1 mill in 2003 up to 31.1 mill in August 2012 and number of Internet subscribers raised from 0.8 mill to 10.1 mill accordingly (Figure 4)⁽²⁴⁾. The share of Internet users - so called penetration - has picked from 4% up to 35.5% at the same period, in Hanoi and Ho Chi Minh City it reached 50% of the population, the terminals were open in all schools and universities and economic regions and provinces of the country⁽²⁵⁾. Growth

dynamics and structure of Internet users in Vietnam are encouraging. The share of consumers of IT services, who carries out modern thinking and way of life among young people forming so called "Internet generation" raised especially notable. There appeared a tendency to increase the user time in the network, expand its use at home (in the first half of the decade up to 36% of all visitors), including women (52%)⁽²⁶⁾.

The most developed kind of the Internet is wired broadband Internet (ADSL). Its growth rate reached 50% in 2009 and 24% in 2010. Mobile broadband is usually purchased by small providers, whose market share is less than 5%, this causes the relatively slow development of this segment. Mobile Internet is usually demanded by large companies, IT companies and banks, which make it promising. As mobile broadband providers have a license for the introduction of 3G, it is assumed that in the future 3G brand will surpass ADSL as has happened in the world before. Prices of mobile phones tend to significantly decrease, which also increases the interest to mobile Internet. However, the high prices of futures contracts and the customers' lack of online education currently hamper the development of the mobile Internet in Vietnam. It was also opened the access to satellite Internet (Iridium. Bgan, Rbgan), but it is not yet common. In 2008 Vietnam launched its first own satellite, in 2012 the second one.

⁽²⁴⁾ OECD. Review of innovation in South-East Asia Country profile of innovation: Vietnam, OECD Directorate for science technology and industry, 2011.

⁽²⁵⁾ See in: VNPT, 2011, *Vietnam telecommunication report*; <http://www.thongkeinternet.vn/jsp/trangchu/index.jsp> – accessed on 15.09.2012.

⁽²⁶⁾ See in: V. M. Mazyrin, *Transition reforms in Vietnam*. Op. cit., 2007, p.252.

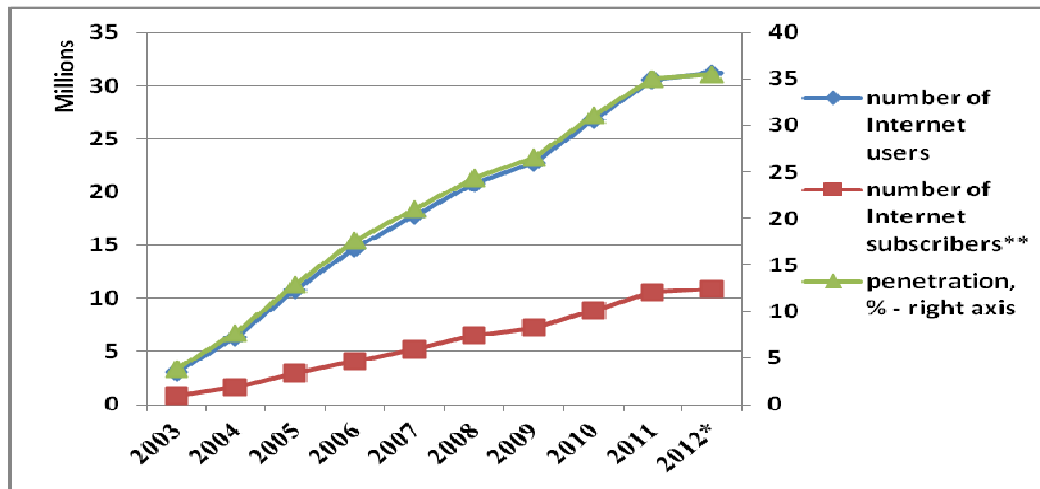


Figure 4: Statistics on Internet development in Vietnam.

Source: <http://www.thongkeinternet.vn/jsp/trangchu/index.jsp>

Comment: * Data is available up to August 2012

** Beginning from 2008 this source replaced data on total subscribers number by total Broadband subscribers number; thus for these period data is author's calculation.

4. The erection of e-government networks

Nowadays Vietnam actively builds up a system of **e-government**. For this project Hanoi allocated USD 3 billion in 2009-2011 (program was launched according to the decision of Prime Minister No. 1605/2010/QD-TTg). It aims to improve and develop co-operation between public and private sectors; an important point is to establish a communication system of online services of treasury, tax authorities, customers and banks.

In order to increase transparency the government intends to accomplish in 2012 a process of transfer into electronic form of the issuance of passports and documents, invitations, and the results of tenders for state-funded projects, tax documents. It is estimated that the development of e-government can save about USD 1.5 billion of taxpayers' money every year. Main expenses along with the "Plan of e-government exploration" will be focused on the development of the IT industry.

In 2012 Vietnam was placed 83-rd out of 193 countries according to the global e-government index (Table 2) with the score 0.5217 (0.4454 in 2010)⁽²⁷⁾. Its gap with the leaders is decreasing while the rating worsens in many East Asian countries⁽²⁸⁾.

⁽²⁷⁾ United Nations E-Government Survey 2002-2012.

⁽²⁸⁾ Research in the field of e-government is held by UN office for Public Economics and Management (UNDPEPA). For calculation of rankings it uses E-gov index, which takes into account several factors, in particular, the representation of government of a country in the Internet, development of telecommunications and general level of "E-Learning" among population. It is a composite index comprising the Web measure index, the Telecommunication infrastructure index and the Human capital index.

Table 2: E-government index trend in some East Asian countries

Country	2001	2003	2004	2005	2008	2010	2012	Score 2005	Score 2012
Vietnam	90	97	112	105	86	90	83	0,3640	0,5217
China	93	74	67	57	68	72	78	0,5078	0,5359
Philippine	69	33	47	41	80	78	88	0,5721	0,5130
Malaysia	60	43	42	43	32	34	40	0,5706	0,6703
Thailand	103	56	50	46	58	76	92	0,5518	0,5093
Indonesia	76	70	85	96	112	109	97	0,3190	0,4949
Singapore	4	12	8	7	23	11	10	0,8503	0,8474
Korea, Rep. of	16	13	5	5	6	1	1	0,8727	0,9283

Source: UNDPEPA, 2005, 2008, 2010, 2012 - <http://www2.unpan.org/egovkb/profilecountry.aspx?>

The first “Master plan for development of e-commerce” was completed in the period of 2006-2010 by decree of Vietnam’s Prime Minister of. It was aimed to erect systems for protection of databases, development and implementation of e-business standards. The report of the Ministry of industry and trade issued in 2009 confirmed that e-commerce in Vietnam was growing extremely fast due to increase in a number of Internet users, although it still significantly lags behind leading countries in the region. This is evident from the following data:

- 100% of Vietnamese enterprises are equipped with computers (in the middle of last decade they were applied only by 90% of public enterprises and 30-40% of private, but usually only to paperwork);
- 88% of companies have Internet access (growth up to 4% compared with 2008);
- 45% of companies have their own websites (growth up to 7% compared to 2008)⁽²⁹⁾.

In 2009 12% of private companies were presented at online markets, such as alibaba.com and EC21.com. 22% of companies use their websites to obtain orders. The specific of e-commerce erection and indicator of the

⁽²⁹⁾ Ministry of Industry and Trade, *Vietnam economic report*, 2010.

interest in it is the growth of investment in software, which accounts in 2011 for 45% of total corporate investment (39% in 2009). Revenue from e-commerce according to the polls from companies was about 5%, but has a tendency to increase⁽³⁰⁾. 5 years ago 40% of businessmen were not decisive enough to invest into this business and didn’t take it in consideration due to a lack of corresponding knowledge and personal.

It appeared a new trend in education system to teach e-commerce. Today this discipline is taught in 49 educational institutions (30 universities and 19 colleges). Three colleges opened departments of electronic commerce in 2010.

One of the goals of the Plan for the development of e-commerce is to provide by 2020 all public services online (tax registration, procedures of export and import, business registration etc.). Real progress was already attained in accomplishing some points of this plan, for example, export procedures became much easier due to widespread introduction of electronic certificates of origin.

Electronic payment system is rapidly evolving. In 2008 banking institutions issued 13.4 million payment cards, an increase of 46% in comparison with 2007. In 2008 there were

⁽³⁰⁾ <http://www.agentschapnl.nl/onderwerp/vietnam-e-business>

7,051 ATM machines (growth up to 46%) and 24,000 POS in Vietnam. Companies began to provide the service of online purchase from the same year; this led to a reduction in cash payments by 14%.

Online education system in Vietnam is only in its infancy. Now various language courses run by expats are dominating but it is too early to talk about the significant achievements and the remarkable growth in this area.

5. Indicators of the knowledge based economy formation

There are known various indicators to evaluate the success of modernization. The maturity of the knowledge economy can be appreciate by the proportion of R&D expenditures in GDP, the share of scientists and engineers among population and those who employed in the economy, the spread of secondary education, the number of applications for registered patents, coverage of TV and Internet access, and many others. Indicators of “second modernization” evaluate

the processes of renovation of knowledge (innovation), and their distribution and use.

Let's use some of macroeconomic indicators that characterize the maturity of advanced segments of Vietnam's economy and its access to global achievements in the early 2000's to check the situation. These indicators are the ratio of FDI (annually implemented capital) to GDP volume (1), the share of modern, i.e. medium and high, technologies in industry (2), the share of manufacturing in GDP and exports (the unweighted average – 3), the number of employees in R&D per ten thousand people (4), the share of R&D expenditure to GDP (5), the share of high-tech products in manufacturing industries (6), the number of scientific journals in access per 10,000 residents (7). Obviously, by the end of the late decade Vietnam's indicators increased; for example, the first parameter up to 11%, the third up to 29%, the sixth up to 48%⁽³¹⁾. But advanced countries of the region have demonstrated even higher growth, thus the gap only increased (Table 3).

Table 3: Comparison of innovation systems maturity in some countries

Country	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	6 (%)	7 (%)
G-7	15	80	33,9	35	2,27	22,1	6,15
Korea, Rep. of	0,67	67	56,0	16	2,82	32	4,6
China	4,09	30	36,1	6,5	0,66	17	2,11
Malaysia	5,53	40	66,6	4	0,24	59	2,65
Thailand	4,08	34	81,5	5	0,13	32	1,94
Indonesia	1,71	30	83,2	6	0,22	59	1,15
Vietnam	7,17	22	24,3	6	0,40	10	0,6*

Source: World Bank. WDI 2001, 2011; Statistical Yearbook of Vietnam 2010. Hanoi, 2011.

* The figure based of author's prediction that the country publishes at least 500 journals (titles).

⁽³¹⁾ Author's calculations based on: GSO, *Statistical Yearbook of Vietnam 2010*, Hanoi, 2011, p.130-132, 151, 426, 525, and other data from Vietnamese sources.

Comparison by other indicators of science and innovation growth also confirms that Vietnam still seriously lags behind its competitors. For example, during 1981-2002 the employees in R&D sector issued only 0.065 research annually and made 0.02% of total reports presented in East Asia (corresponding figures of Thailand were 0.2 and 0.11%, of Malaysia 0.37 and 0.08%). As for scientific publications in early 2000's Vietnam attained the level of Thailand and Singapore, which they had in 1980's. In 1998 there were registered in Vietnam 25 inventions and in 2002 the figure was 69 (while in Thailand 477 and 3030). The situation with copyright protection is typical too: in early 2000's they were violated in 95-97% of all cases, that's why the protection of intellectual property is recognized as one of the major tasks of protection of property rights in general⁽³²⁾.

The total investment in R&D at the moment reached 0.6% of GDP, 80% of all investments in this sector are realized by the state, the share of private sector and other non-state enterprises doesn't exceed 20%. Investment in research projects is extremely low. Most of scholars work in research institutes (40,000 people.) and have no contact with business. The problem rests on the lack of investment funds and of qualified personnel. Vietnam has quite low position in the ranking by patent number with 95% of all patents granted to enterprises with foreign ownership. In 2008 the number of patents issued in Vietnam was 7460 and the foreigners registered 7100 patents while Vietnamese only 360. Vietnam also stays on

lower position in the ranking of international citations⁽³³⁾.

In general, the spread of IT in the country is constrained by low income of habitants and high costs of equipment and services, acute shortage of specialists and backwardness of public policy in regard to the requirements of knowledge management. It is no surprise that Vietnam posed a task to quickly expand its own production of hard and software of good quality at affordable prices in order to meet 95% of domestic demand. The creation of software is regarded as one of the promising areas of IT specialization according to the example of India.

In the ranking of the movement towards information society calculated by the IDC agency together with World Time magazine, Vietnam took 52-nd place out of 53 in 2004. This index is calculated on the basis of data on computers, Internet, telecommunication use and public perception of IT. Progress in this area is also estimated with the help of e-readiness index calculated by well-known EIU agency. In 2007 Vietnam was ranked 65-th with 3.78 points; in 2002 it occupied 56-th position with 2.96 points. The International Telecommunication Union placed Vietnam 122-th out of 196 countries in its ranking of IT technologies in 2003. In regard to the number of Internet users (per 10,000 habitants) Vietnam was ranked 82-nd, and to the number of computers (per 100 people) it was placed 126-th⁽³⁴⁾. But the country achieved evident progress during next decade.

⁽³²⁾ See in: *Knowledge-based economic development*. Op. cit., p. 204-205, 209.

⁽³³⁾ OECD, *Review of innovation in South-East Asia Country profile of innovation: Vietnam*, 2011, OECD Directorate for science technology and industry.

⁽³⁴⁾ See in: *Knowledge-based economic development*. Op. cit., p.206.

In general, we can evaluate the development of knowledge based economy in Vietnam and its ranking in comparison to other countries by using special index - knowledge economy index (KEI), which was introduced by WB. World Bank evaluated data on 146 countries and placed Vietnam on 104-nd position in 2012 (it was ranked 94th in 2006). A comparison confirmed that the KEI is in direct high correlation ($k = 0,88$) to the size of per capita GDP, indicating a high degree of

economic maturity necessary for transition to a qualitatively new level. Fixing five stages of knowledge based economy the World Bank placed Vietnam at the second one with 3.4 points (out of 10)⁽³⁵⁾. Compared with its neighbors in East and South Asia Vietnam is moving towards the goal faster than others, except of China, to whom it significantly losses and already takes the lead over Indonesia and India (Table 4). Detailed indexes can be seen in the annex (Table 5).

Table 4: The state of knowledge economy index (KEI) in East Asia countries

Страна	2012		2006 score	1995 score	Change 2006 to 1995	Change 2012 to 2006
	rank	score				
Vietnam	104	3,40	3,10	2,15	+ 0,95	+ 0,3
Malaysia	48	6,10	6,23	5,46	+ 0,77	- 0,13
Indonesia	108	3,11	3,29	3,29	0,00	- 0,18
Thailand	66	5,21	5,41	5,70	- 0,29	- 0,2
Philippine	92	3,94	4,48	4,79	- 0,31	- 0,54
Laos	131	1,75	1,17	0,72	+ 0,45	+ 0,58
China	84	4,37	4,42	2,61	+ 1,81	- 0,05
India	110	3,06	3,0	2,94	+ 0,06	+ 0,06
Japan	22	8,28	8,46	8,60	- 0,14	- 0,18

Source: World Bank Institute, 2010- http://info.worldbank.org/etools/kam2/KAM_page5.asp

In order to move forward Vietnam needs to implement the strategy of "structural wave" and follow the leaders as in the "flock of flying birds".⁽³⁵⁾ Then the transition to innovative stage can be carried out over few decades⁽³⁶⁾. In such a case its development should progress "abruptly", rather than gradually like industrialization was done. This will help to dramatically change the overall structure of Vietnam's economy.

⁽³⁵⁾ The index is based on four main factors: the state of economic system (improving of its openness and democracy, competitiveness), updating of knowledge (innovation), education and information technologies development. See in: *Knowledge-based economic development*, Op. cit., p.102-105, 218.

⁽³⁶⁾ See in: J. Naisbitte – P. Aburdence, 1992, *Core Tendencies of 2000's*. Ho Chi Minh City Publishing House. For example, Vietnam opted for shipbuilding, in which technology were historically transferred from the UK to Norway, Japan, and then to the South Korea.

Bringing forward a concept of catching-up, spasmodic development can be accepted as creative input of Vietnam into understanding of economic growth theory⁽³⁷⁾.

Objectively this way has become more accessible now: the world is undergoing major technological changes under transition from one technological generation to another. Vietnam has a chance that happens "once in a thousand years". Besides the country started development of knowledge based industries and services quite recently and lagged behind not so strong as it was during industrialization of old style.

⁽³⁷⁾ See in: Tran Dinh Thien, 2012, *Vietnamese model of industrialization and modernization in the renewal period in the transfer to the market in Russia, China and Vietnam: a comparative analysis* (in Russian), RAS IFES, Moscow, 2012, p.135.

6. Conclusion

The tasks of Vietnam industrialization are mainly close to completion. Their accelerated implementation has brought - along with significant increase in the capacity and speed of economic development - a number of major macroeconomic imbalances and disparities because of extensive form, in which it was executed.

Today the country assesses information revolution that helps economic activities and people's being. A major technological innovation in economy has started and determines the duration of the process of infrastructure building necessary for the country's transition to a new type of management based on knowledge. Innovative development became natural extension of industrialization phase and determinant the of Vietnam's future.

High speed of information development in Vietnam is firstly due to its serious backlog in this area that means fast closing of the technological gap due to stable growth of national economy. Secondly, the significant role was played by the State's efforts to implement IT programs and the adoption of appropriate course of development. The demographic structure of Vietnamese population influences too: young Vietnamese,

which consist most of it, are highly susceptible to a variety of information and technological innovation. Finally, external factors favorably affect the creation of information infrastructure. This is a demonstration effect through the development of tourism, the aid of rich Việt kiều diaspora, the opening of Vietnam to the outside world, especially upon the entry into the WTO, and the ensuring huge inflow of FDI.

Although right strategy of the ICT sector development was chosen Vietnam lacks many conditions for its implementation, especially financial resources, and can't resolve fast a number of problems. For example, it still exist high degree of state monopoly on information services market as well as censorship on the Internet. These problems have contradictory, not always positive, influence on this sector development. Positive changes in the public and leadership consciousness are not keeping pace with the demands of information age and modern knowledge. A number of new segments that meet market demand have been progressing rapidly; however, generally Vietnam failed to catch up countries that move ahead. In order to transit to a knowledge based economy there is a need to reduce existing "digital gap" from them, to create innovative potential of its own. According to our best forecasts it could happen by 2030.

Annex: Table 5: Detailed composition of Vietnam's innovative economy indexes

Index	Score
1. Knowledge Economy Index (Average of 3,4,5,6)	2.94
2. Knowledge Index (Average of 4,5,6)	3.04
3. Economic Incentive and Institutional Regime	2.64
4. Education	2.28
5. Innovation	2.34
6. ICT	4.50

Variable	actual	normalized
Tariff & Nontariff Barriers, 2011	44.60	1.86
Regulatory Quality, 2009	-0.24	2.87
Rule of Law, 2009	-0.48	3.19
Royalty Payments and receipts (US\$/pop.) 2009	n/a	n/a
S&E Journal Articles / Mil. people, 2007	1.42	1.52
Patents Granted by USPTO / Mil. people, avg 2005-2009	0.00	3.17
Average Years of Schooling, 2010	4.57	1.89
Gross Secondary Enrollment rate, 2009	47.04	3.13
Gross Tertiary Enrollment rate, 2009	4.09	1.82
Total Telephones per 1000 People, 2009	10.00	2.55
Computers per 1000 People, 2008	0.00	3.49
Internet Users per 1000 People, 2009	0.00	7.45

Source: http://info.worldbank.org/etools/kam2/KAM_page2.asp? updated January 2012.

The paper explores the concept of modernization which is carried out in Vietnam from the middle of the 1990's, its main tasks, methods and stages, influence of the experience of new industrial states of East Asia. Forms and results of this industrialization are revealed; features of this process in SRV in comparison with other known models are noted. Signs and degree of a maturity of an innovative component in the Vietnamese society, problems and transition prospects to "a knowledge based economy" are defined. New spheres, tasks, indicators of economic growth in current decade are characterized. In conclusion it is stressed that despite successes of "catching-up development" Vietnam continues to lag behind the advanced countries of the region and aspires to accelerate modernization process by changing character,

rates and realms of development. Assuming world financial crisis in 2008-2011 as a driver to cardinal change main trends of progress, balance of forces and a situation in the world, the author tries to estimate, what place Vietnam will occupy in the post-crisis era. Such possibility depends decisively on how fast and successfully the country will finish the process of industrialization and will pass to an innovative stage of development.

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