

dr Krzysztof Piech

Economic Policy Department, Warsaw School of Economics

The Knowledge Institute, Warsaw

Digitalism and the fourth sector

The goal of this paper is to present and try to summarise the historical and contemporary changes in economic systems. An idea of a new economic system we are facing nowadays will be presented¹. I will also try to present some preliminary analysis of the size of the so-called fourth sector of economy².

1. An outline of economic systems evolution

Looking at the evolution of economic systems, feudalism and capitalism should be mentioned, as two dominating ones during the history of countries. We can also enumerate socialism (or communism), that finally almost completely collapsed. However, this distinction should be reconsidered in a more detailed way, because there are no consensus between economists on a definition and types of economic systems.

1.1. Idea and types of economic systems

One of the classic definitions of economic system describe it as a collection of interrelated economic institutions, e.g. companies, consumers, political parties, market, planning etc.³

¹ This concept has been presented so far in: K. Piech, *Perspektywy polityki gospodarczej w dobie nowej gospodarki*, [in:] *Wpływ otoczenia na zarządzanie i finansowanie przedsiębiorstw. Część II: Przedsiębiorstwo wobec wyzwań przyszłości*, Warsaw School of Economics, Warsaw 2001, p. 17; K. Piech, *Konkurencyjność gospodarki Polski w dobie rewolucji informacyjnej a wejście do Unii Europejskiej*, „Studia i Prace Kolegium Zarządzania i Finansów SGH” 2001, no. 22, p. 20-21; K. Piech, *Digitalism*, in: K. Piech (ed.), *European Economy: Opportunities of Change*, The Knowledge Institute, Warsaw 2002, pp. 62-70; K. Piech, *Competitiveness of Central and East European Countries and Economic Policy towards Transition to Digitalism*. in: K. Piech (ed.), *Economic Policy and Growth in Central and East European Countries*, School of Slavonic and East European Studies – University College London, London 2002 (forthcoming).

² This concept is being used in literature and in Poland quoted by G. Kołodko e.g. in: G. Kołodko, *Globalizacja a perspektywy rozwoju krajów postsocjalistycznych*, TNOiK, Toruń 2001, p. 38; G. Kołodko, „Nowa gospodarka” i stare problemy, in: G. Kołodko (red.), „Nowa gospodarka” i jej implikacje dla długookresowego wzrostu w krajach postsocjalistycznych, Wydawnictwo Wyższej Szkoły Przedsiębiorczości i Zarządzania im. Leona Koźmińskiego Warszawa 2001, p. 13-14.

³ WW. Loucks, W.G. Whitney, *Comparative Economic Systems*, Harper and Row, New York 1973, s. 13-14; quoted after: J. Kaja, *Polityka gospodarcza. Wstęp do teorii*, Oficyna Wydawnicza SGH, Warszawa 1999, s. 35.

The ‘New Economy’ and Old Problems. Prospects for Fast Growth in Transition Economies, March 14 – 15, 2002

From the point of view of our region, there can be mentioned the works of L. Balcerowicz. As a specialist of comparative economic systems,⁴ he was one of not numerous economists, who has been able to elaborate and introduce the program of economic transformation. He treated the economic system quite narrowly: as a collection of features specific for a certain country.

Another scientist, surely better known in analysis of socialist economic system, is J. Kornai. Nowadays he indicates only two economic systems: capitalist and socialist one.⁵ He also does not accept the common – in the West – interpretation of economic system as a set of institutions and rules governing a national economy. Nevertheless, according to some economists, his point of view can be reconciled with the opinions of the majority of specialists of comparative system analysis.⁶

Some advanced theories on economic systems offer German economists. L. Erhardt and K. Adenauer, based on works of W. Eucken and A. Mueller-Armack, introduced in Germany a new economic order – social market economy (*Soziale Marktwirtschaft*). One of the reasons of this fact was a transformation of economic system of post-war West Germany from “purely” capitalist system to the one with more intensive social protection and cohesion. They even introduced – apart from economic policy, social policy, foreign policy etc. – the term: “order policy” (*Ordnungspolitik*), as one of the kinds of a country’s policy. A kind of economic order (*Wirtschaftsorder*) where the state take over the task of the product division in the frames of market economy is social market economy.⁷ That is why the Germans sometimes distinguish three economic systems.

There should be also mentioned that some economists indicate also a few other types of systems, e.g. Scandinavian, Latin American, East Asian, Japanese and so on. All kinds of divisions depend strongly of the definition of economic system: if it has wide or narrow meaning. However further in this paper there will be assumed the first scope of definition. It is more justified from theoretical point of view. The main (in a wide meaning) economic

⁴ L. Balcerowicz, *Systemy gospodarcze. Elementy analizy porównawczej*, Warszawa 1989.

⁵ J. Kornai, *What the change of system does and does not mean?*, paper for the conference *Evolution et transformation des systems economiques*, Paris 19-20 June 1998.

⁶ T. Kowalik, *Współczesne systemy ekonomiczne. Powstawanie, ewolucja, kryzys*, Wydawnictwo Wyższej Szkoły Przedsiębiorczości i Zarządzania im. Leona Koźmińskiego, Warszawa 2000, s. 11.

⁷ A. Woll, *Allgemeine Volkswirtschaftslehre*, 10. Auflage, Verlag Franz Vahlen, Muenchen 1990, p. 71.

systems were based on an economic theory (apart from feudalism, when economics had not existed yet). Thus, economic policy or order policy was conducted “consciously” by the governments. Whereas the minor (in a narrow meaning) economic systems are only the forms of economic order, with different development of and specific subsystems, resulting rather from the different internal and external conditions, without taking into account doctrinal conditions (in a sense of a kind of economic theory).⁸

1.2. Economic systems from a retrospective perspective

Feudalism was the first economic system. It functioned in ancient times and later: from the creation of national economies to c.a. 18th century. The economic system was able to emerge only in organised structures – that is why it existed in countries and not in unorganised social groups. Feudalism was based on agriculture, as a main (and the only) sector of economy. With the territorial expansion of some countries – what helped to use the economies of scale, some parts of the ancient world, which could naturally (i.e. basing on natural resources or geographical advantages) specialise in production of certain goods – the trade emerged. It helped moving the products from suppliers to customers, who demanded them. Furthermore, the trade allowed and stimulated further specialisation of regions and even of nations. A necessary thing, which enabled the transfer of goods among trading partners, was a currency, and especially in larger amounts. Thus, the capital became important in economic development.

Looking at the world economic history the following main processes could be noticed. At first, the countries acquired superiority through their territorial conquest, winning the wars with other countries (as ancient Greece and especially Rome did). The main factors of production were land and labour force (slaves). Thus those, who got more of them, could increase the welfare of their nations. It was possible thanks to a better organisation and effectiveness of military activities, and weapons better than the enemies had.

⁸ Author in defining ‘economic policy’ distinguishes three kinds of conditions: internal, external, and doctrinal. The last one relates to the economic theories. See e.g.: K. Piech, *Etymologiczna i sokratyczna definicja polityki gospodarczej*, “Polityka Gospodarcza” no. 5-6, 2001-2002, p. 235-259.

Further evolution of the world economy led to forming the institutions, which gathered currency to allow the people who needed the money to borrow it from those, who had its surpluses. The banks were the crucial factor, which influenced the emergence of capitalism.

The Renaissance was the epoch when the conquest of America and other parts of the world were enabled due to various inventions. Among them, there were especially important those that allowed the deep-sea expeditions: quadrant, astrolabe, compass, and ability to build caravels. During those expeditions, Portugal and Spain (and later other countries) gained the land and labour force, but even more important was capital, which started to be the next, third factor of production. This phase of development of the world economy and international relations is called: colonialism. It was also the second – after the conquests of Romans in ancient times – phase of globalisation.

Next, the technological progress had led to the Industrial Revolution. It began in England in 18th century. The first stage of the Industrial Revolution developed textile industry. It was possible due to the invention of flying shuttle by John Kay in 1733. The second textile revolution began in 1784, when Edmund Cartwright invented the power loom. These changes were accompanied by protests of parts of society – the Luddites, who deliberately smashed machinery in industrial centres of England (in 1780 and 1820). The accumulation of capital enabled building the constructions that were more complicated: manufactories and factories.

The next stage of the Industrial Revolution was caused by the development of heavy industry. It was possible due to invention, again; but this time not connected with textile. It was the steam engine (patented in 1769 by James Watt). It enabled further development of sailing as well as new branch of industry – railways. Thereafter the development of railways led to further economic progress of the world.

During the 19th century, the Industrial Revolution occurred in other countries. The case of Japan is especially interesting. It succeed in the twentieth century not because of the land and its resources, cheap labour force or accumulation of capital, but because of good organisation of production processes, which began to be the pattern to be followed by others. According to the opinions of many economists and management theoreticians, the next factor of production began to be the ‘know-how’.

Looking at other countries of Southeast Asia, the reasons of success of the ‘Asian tigers’ were different. These countries used cheap, efficient labour force and created favourable conditions to attract the foreign investment (especially the direct one). Thus, they developed their economies thanks to more traditional factors: labour force and capital. However, this region is also known because of its cheap electronic appliances. Their production could not be possible without staff, which was trained and educated well enough, to drive the economic growth. Therefore, the education of the society was one of the elements, supplementing the ‘labour force’ factor of production and economic development.

The next phase of technical evolution was connected with the discoveries of electrical devices: telegraph, telephone, radio as well as home appliances like lighting etc. It was accompanied by the subsequent territorial expansion of our industrial civilisation over less advanced ones. Thereafter, with other inventions, the next phase of production of sophisticated mechanisms has started – this time, not only electric devices but also electronic ones. When the opportunities of territorial expansion ended, the era of outer space exploration has begun.

Writing about economic systems in a narrower sense it is necessary to mention contemporary China, as well as some other cases. In the People’s Republic of China, we can observe the process of transition from communism to capitalism under socialistic control. The trend to a free market was allowed and even approved by the authorities, what was unimaginable a few decades ago. So now, there exist socialism with many elements of capitalism.⁹ The important indicator of China’s system transformation is its entrance to the World Trade Organisation. It is the next example that the will of the majority of society to be free and to feel freedom is more important than the slogans about universal welfare etc. It also explains in some way why the left wing parties are so popular in Western Europe. Their programs are supported by the majority of society and not by a certain class or a social group (like e.g. entrepreneurs).

The circumstances of emerging the so-called Swedish or Japanese system, which are also worth mentioning, were different. Both were partly caused by isolation of these economies and were connected with their internal problems, history etc.

Another interesting case is the example of social market economy in Germany (*soziale Marktwirtschaft*), which – opposite to the Chinese case – was a model of market economy with strong elements of social protection. The reason of its emergence was also different from the Chinese one – not by force, revolution with the help of army, but by the consequences of World War II and factors, which caused this war. According to the results of author's studies the reason of introducing the social market system are the experiences of the Great Crisis (1929-1933). Thus the system, which fundamentals were created by Walter Eucken, developed with Alfred Mueller-Armack and introduced by Ludwig Erhard and Konrad Adenauer¹⁰ was the answer for the dramatically bad economic and social conditions of Germany in the early 1930s. The growing unemployment rate induced the support of the society for extremist parties, like NSDAP. In terms of the theory of crises, there could be stated that the prolonged and deep economic crisis led to the serious social crisis and both caused political crisis. The political crisis enabled gaining by NSDAP the majority in parliament (Bundestag), what was the first step to the World War II.

1.3. Sources of nations' economic success

While analysing the economic history of the world, it is difficult to divide the countries into the groups of rich and poor, as well as undoubtedly enumerate factors leading to the development of economies. In 17th and 18th century, the reasons of welfare started to be investigated and were identified with the amount of money, especially gold and silver, inside the country. Thus according to the mercantilists, to increase the welfare of nations, as we could describe it with contemporary, economic terms, there should be a pro-export economic policy conducted. However later, Smith and others drew attention to the effects of the increase of money supply in circulation. He concluded that the welfare of nations depends on the labour productivity, and it – on accumulation of capital. There should also be mentioned Ricardo's theory of comparative costs, according to which the countries gain the superiority through their specialisation (thus, not only effectiveness of work is important, but also the alternative cost of a good's production). Mill added to these explanations another one – the terms of trade.

⁹ J. Kaja, X. Yu, *Two roads, one goal – the comparison of Polish and Chinese administrative reform*, „Polityka Gospodarcza”, no. 3, June 2000, p. 17-24.

¹⁰ A. Hermann, *Wirtschaftspolitik und Regierungssystem der Bundesrepublik Deutschland. Eine Einfuehrung*, Bundeszentrale fuer politische Bildung, Bonn 1995, 3. Auflage, p. 41.

With the passage of time, more advanced explanations emerged, concerning the non-economic factors as well. One of them can be an institutional sphere of the society, importance of which Schumpeter has emphasised. According to him, entrepreneurs, who take the risk and introduce inventions to the economy, cause the economic growth. However, the entrepreneurship, as Peter Drucker formulated it, means a good management. In addition, Solow's surveys at the beginning of the 1980s confirmed the importance of technological innovations and of increase of so called 'know-how' in an economy.

Knowledge was for the long time recognised as an important element of economic growth. However the traditional, classical ones (labour, capital, land) with Schumpeterian innovation, attracted most of the attention of scientists. In 1990s knowledge has gained more importance. Now economists try to include technology and knowledge in their models more directly. Moreover, investments in knowledge can increase the effectiveness of other factors of production. It has its reflection in building the *new growth theory*, where knowledge and technology drive productivity and economic growth, and are endogenous. As knowledge is endogenous, it depends also on economic and social policies, but not on free market itself.

However, „generally there are no accepted empirical measures of store of technical knowledge, human capital (...) rate of aging the knowledge etc.”¹¹ and it is not the problem of the lack of data, but of a theory. Thus, there is still much to do in the growth theories.

We should also notice the tendencies to acceleration of technological development of the world. Thus, inventions gain their purchasers increasingly faster. It means that new discoveries and inventions are done more and more faster, partly because the older ones are getting outdated faster. Such factors like land, labour and capital or even 'know-how' begin to be more important, but nowadays the knowledge and also – what should be emphasised – the speed of its creation are becoming more and more important.¹²

¹¹ P. Aghion, P. Howitt, *Endogenous Growth Theory*, Cambridge, Massachusetts and London 1998: MIT Press, p. 435.

¹² It is also sometimes stated that the new concept of teaching should be introduced in order to catch up the technological progress. It is the *just-in-time learning* (and *distance learning*). K. Piech, *Wiedza na czas*, „Computerworld Polska”, 2001, no. 2, p. 44-45; K. Piech, *Life-time-learning – konieczność doby rewolucji informacyjnej a polityka edukacyjna państw*, w: A. Zbierzchowska (red.), *Kształcenie ustawiczne w warunkach globalizacji i rozwoju społeczeństwa informacyjnego*, Instytut Wiedzy, Warszawa 2002, s. 121-130.

There should be mentioned another factor, as well. The countries owe the economic success not only to the internal, but also to external achievements compared to the achievements of the others. It was possible in the past that the countries reached the internal economic growth without external, economic relations (e.g. ancient China). It was possible to isolate a country almost completely from the rest of the world. Nowadays it is very difficult to maintain such a status. Thus, the external relations contribute to the economic development almost everywhere. There exist also the situations, when countries compete for the best relations with other economies in order to win as much as possible welfare for them (and their citizens). Moreover, assuming that there are countries with very similar internal conditions for economic growth, those win the most, which are able to obtain better external relations. Therefore, the economic growth and the welfare of nations also depend on the results of competition between the countries. In addition, they depend very often on such factors like competitiveness of exports. It means a good is the more competitive, the more demand is for it and the less supply. Moreover, the supply of those goods, which are new or their production is difficult, is very often limited and small. Those are e.g. high-tech products. It means that the countries, which want to win the competition game with others, must specialise in production of goods from the sector of advanced technologies.¹³

However, the need for the new technologies, which more and more countries will demand, will lead to the constant growth of the high-tech sector in many countries. It emerged on a larger scale in some countries and thanks to this factor they could achieve a very high economic growth at the end of 1990s.

2. An idea of digitalism

The world economy changes and it is a fact. Can we be sure that it cannot cause such major changes in economies leading to the emergence of any new economic system?

¹³ To confirm it I recall the statement of one the ministers of previous Polish government, who on the special lecture organised on March 1, 2000, by the Student Scientific Society of Economic Policy at Warsaw School of Economics, asked a rhetoric question: "According to the theory of comparative costs of David Ricardo England should specialise in production of clothes and Portugal – wine, because it will be the best for both of them. But you can see where Portugal and the Great Britain now are", as far as the economic development is concerned. W. Bieńkowski, *Polityka ekonomiczna i jej wpływy na konkurencyjność gospodarki we współczesnym świecie. Wnioski dla Polski*, in: J. Bossak, W. Bieńkowski, *Konkurencyjność gospodarki Polski w dobie integracji z Unią Europejską i globalizacji*, part I, Instytut Gospodarki Światowej SGH, Warsaw 2001, p. 58.

2.1. An outline of economic sectors evolution

During the last decades, in the structure of economies all over the world an important role started to play not agriculture, not industry, but services. It is a very well known economic fact. However, many economists insist that present times are the era of post-industrial world.

However nowadays the so called most industrialised countries have paradoxically most developed services sector. This is still the heritage from the industrial revolution and its influence on socio-economic life. Now, one of the ways of comparing the advances in economic development of countries is the comparison of the size of their service sectors, because it is accepted that this sector is the largest in developed countries. Those countries – for example from the third world – usually still have the biggest share of agriculture in an economy. Other less developed countries enlarge their industrial sector.

The changes in societies throughout history replaced agrarian populations with urban communities. Nowadays, we see that hierarchical, punctual, industrial society changed into a decentralised, networked information society (or its early form: post-industrial society, as called by Drucker¹⁴: post-capitalist society) or knowledge society.

However, if we look at the economic development phenomena from such a ‘macrohistorical’ point of view there could be noticed one other, important thing. The world economy has not stopped in its development. Inside services sector the share of information (data, knowledge) exchange grew up. Also in industry, more and more companies manufacture the technologically advanced products. They are connected with a kind of information exchange, too. This factor in some situations, e.g. on contemporary, global capital markets, is even more important than traditional: labour force, land, and capital. If a financial institution wants to gain profits, it is not enough that it has a large amount of money. However also the knowledge about the things it can derive profits from, as well as to be able to make a decision earlier than competitors – often very important are seconds, or even fractions of seconds! Similar situation is with new products entering the market: they should not only be manufactured but it also should be done before the competitors did the same. It means that a producer should have also appropriate knowledge in a due time (just in time). Due to the time,

¹⁴ P. Drucker, *Post-Capitalist Society*, HarperCollins, New York 1993.

the knowledge is transferred more and more often not in a paper way, but in a digital form. There can be imagined as an example the functioning of a modern stock exchange, where the orders are made only in a paper way (what would dramatically slowdown its operations), or a conducting the precise production (e.g. of microchips) without the use of computer controlled machines etc. Even the genotype can be decoded and written in a form of information to be understood more easily by specialists.

All, increasingly more dense modern technologies function basing on information, coded in a binary form, where only two digits are used: 0 and 1. As the process of information revolution deepens and concerns more and more countries, the global technological spillover happens. Thus, the more intensive is the use of digital notation. Without exaggerating too much it can be stated that nowadays the further continued economic development is not possible without digital notation (it is also worth to notice that all written words can be coded in a sequence of zeros and ones).

2.2. Digitalism as a next step of economic systems

The last step in systems development, which is still visible today, is the growing share of high-technology industry and services, through the use of inventions like computers and Internet, as well as mobile telephones, on-line financial transactions, digital money etc. New factors become important for economic growth replacing the old ones. “The traditional factors of production – land, labour and capital – are becoming restraints rather than driving forces. Knowledge is becoming the one critical factor of production.” – Peter Drucker as quoted in the ‘Wired’ magazine¹⁵. With its use, it is possible to collect the capital, and later hire the labour force with expected managerial skills (entrepreneurship), and to buy a land.

Feudalism was a system based on agricultural production, it needed only land and labour force. After building first textile manufactories and inventing steam machines, what caused first and second industrial revolution, in order to use them intensive enough to derive the profits, it was necessary to develop banking system. Not only human work was needed to success but also the capital, thanks to which it became possible to build factories and products that were more sophisticated. Next at the beginning of the 20th century the next step of

¹⁵ P. Schwartz, ‘Post-Capitalist’, *Wired*, Issue 1.03 – July/August 1993.

industrial revolution occurred. Apart from capital, there became needed also the know-how, the knowledge how to order the things to work better than previously. With the progress of social development the size of services sector in an economy has increased.

There should be also mentioned the socialist system. Contemporary economic history has shown that it was not a permanent system. Although many of the most developed countries have more intensive social protection than previously, at the beginning of socialism, even after the World War II. Thus, the capitalist system adopted some solutions of socialism.

The society of today – through the fast change and massive flow of information – has to adopt more knowledge, than ever before.¹⁶ “The illiterate of the 21st century will not be those who cannot read and write, but those who cannot learn, unlearn, and relearn.” – as Alvin Toffler has said. Thus, continuous learning is a necessity. The only solution for an adoption of massive quantity of money is to use it in an electronic, digital form. Nowadays, knowledge is often collected electronically, because of faster access, in comparison with traditional documents.

The digital notation is a basis of contemporary economic development. It is achieved not only by use of the labour force, land, and money, but also by the use of electronically transferable information, stored in the form of a binary code.

The changes in the world economy caused by the next technological – this time: information – revolution, which happened in the 1990s, which will continue in next years and even decades, lead to the creation of a new economic system, which I would name as digitalism.

There is presented (figure 1) some information from different points of view on evolution of economic systems. There were chosen only a few main characteristics of economic systems throughout a history.

¹⁶ “The growing codification of knowledge and its transmission through communications and computer networks has led to the emerging ‘information society’. The need for workers to acquire a range of skills and to continuously adapt these skills underlies the ‘learning economy’.” *The Knowledge-based Economy*, OECD, Paris 1996, p. 3.

Figure 1. Evolution of economic systems

Name of a system	A kind of economy (society)	Factors of production	Main technology	Date
<i>non</i>	<i>non</i>	labour	“muscles”	antiquity – the Middle Ages
↓				
feudalism	agricultural	land and labour	agricultural tools	Antiquity – 18th century
↓				
capitalism	industrial (production)	capital, land, labour	textile	2 nd half of 18th century
			steam engines	1 st half of 19th century
			transport (railways)	2 nd half of 19th century
			electricity, cars, telephone	1 st half of 20th century
↓				
socialism		labour, land, capital		1950s – 1980s
capitalism with social elements	post-industrial (services)	capital, know-how, (skilled) labour	radio & television	2 nd half of 20th century
↓				
digitalism	knowledge-based (information)	knowledge, (skilled) labour, capital	personal computer and internet	1980s – till now

3. How large is the fourth sector?

As it was noted, some economists suggest that there are four sectors of an economy. The need for more detailed national accounts system emerged with the increase of share of services in national economies, especially in GDP. Thus, the traditional, three-sector division of economy should be modified.

Some authors indicate that the fourth sector bases on information (*information based* or *knowledge intensive sector*). According to Machlup, the fourth sector consists of education, research, publishing and broadcasting. Harper even suggested introduction of the fifth sector, which would consist of persons having control functions and dealing with unique, not routine process of information.¹⁷

However, if there will be assumed that in the 1990s a new sector of economy started to emerge, it should be measured in some way, how large is it. It would not be justified – from the purely scientific point of view – to introduce a new idea, like the fourth sector existence, without at least a few quantitative arguments that will prove it. Such behaviour could be possible in the 1930s in case of J.M. Keynes's ideas, but nowadays with domination of main stream economics, a quantitative approach is very popular as well as even necessary.

There are almost no research results showing the size of the fourth sector in an economy. However, it can be approximated in some ways, and some of them will be presented below. According to Machlup, in 1958, it accounted the share of 31% of employees in the United States.¹⁸

There is a notion: 'digital divide', which means that with the development of new technologies especially information technology, the society as well as the world economies will be more and more divided. This term refers to the gap between individuals, households, businesses and geographic areas at different socio-economic levels with regard both to their opportunities to access information and communication technologies (ICTs) and to their use of the Internet for a wide variety of activities.¹⁹ This term refers also to the division of countries into groups of technologically advanced (in terms of ICTs) and others.

There are some surveys counting how intensive the use of information technologies is in economies, where the information society and information infrastructure is developed the most etc. OECD delivers most of them. Some set of exemplary data are provided below (table

¹⁷ R.A. Harper, Metropolitan areas as transnational centers in C. Christian, R.A. Harper (eds.), *Modern Metropolitan Systems*, Columbus 1982, Merrill, pp. 87-109; przyt. za: E. Malecki, *Technology and Economic Development: The Dynamics of Local, Regional and National Competitiveness*, 2nd edition, Longman, Essex 1997, p. 26.

¹⁸ E. Machlup, *The Production and Distribution of Knowledge in the United States*, Princeton University Press, Princeton 1962.

1). As it can be seen in table 1 and figure 2, Poland is out of the group of ITC ‘advanced users’.²⁰ Poland is lagging behind the contemporary, modern technological changes and its entrance to the knowledge-based economy will delay.

Table 1. Share of knowledge statistics in different countries and groups of countries

	OECD	UE	UK	USA	Sweden	Czech Rep.	Hungary	Poland
Investment in knowledge (% of GDP, 1998)	4 , 7	3 , 6	3 , 9	6 , 0	6 , 5	3 , 3	2 , 6	
R&D intensity, % of GDP, 1999	2 , 2	1 , 9	1 , 9	2 , 7	3 , 8	1 , 3	0 , 7	0 , 8
ICT expenditures, % of GDP, 1999			5 , 9	7 , 8	7 , 5	6 , 8	7 , 2	5 , 9
Share of high-tech industry in manufacturing exports, %, 1996	1 7	1 4	2 6	2 7	1 9	5	7	4

Sources: used latest possible data from: OECD (1999a), *The Knowledge-Based Economy: A set of facts and figures*, Paris; OECD (2001), *OECD Science, Technology and Industry Scoreboard 2001 – Towards a knowledge-based economy*, Paris; OECD (2002), *Measuring the Information Economy*, Paris.

As it could be seen (table 1), some of the main characteristics of the so-called knowledge-based economy, where the most important (and usually fastest growing) sector of economy is the knowledge sector. Thus, e.g. investment in knowledge and ICT expenditure are becoming the visible percentage share of national economy.

¹⁹ *Understanding the digital divide*, OECD, www.oecd.org/dsti/sti/prod/Digital_divide.pdf

²⁰ According to the OECD estimates, Poland is in the group off seven OECD countries, which have a quite strong comparative advantage in medium-low-technology and low-technology industries. *STI Scoreboard 2001*, OECD, Paris 2001, p. 132.

All industries use new technology and knowledge, but some are more technology-intensive than the others are. OECD provides quantitative analyses of the trade of high-technology products, especially its share in exports (table 1, figure 2). It consists of the following sorts of production: pharmaceuticals, radio, television and communication equipment, computers, scientific instruments, aircraft.²¹

The share of “new economy products” or the size of fourth sector can be also measured basing on value added. In OECD countries, high- and medium-high-technology manufacturing accounted for about 9% of the total value added. For example in Ireland, high- and medium-high-technology manufacturing was the main growth factor, and now it has over 16% of total value added.

Table 2. Share of high- and medium-high-technology manufacturing value added in total gross value added in chosen countries (at current prices, in %)

	Canada	Mexico	United	Japan	Korea	Belgium	Czech	Finland	France	Germany	Hungary	Ireland	Italy	Slovak	Sweden	Switzerland	United	EU*	Total
19..	7	8	8	8	8	8	7	8	8	8	8	7	8	8	8	8	8	8	8
HT	,0	,4	,7	,6	,6		,4	,5	,5	,1	,5	,6	,6		,5	11,5	,0	,2	,1
MH						,3								,9					
T	,3	,9	,8	,1	,0		,3	,5	,9	,6	,8	,8	,6		,5		,1	,2	,7

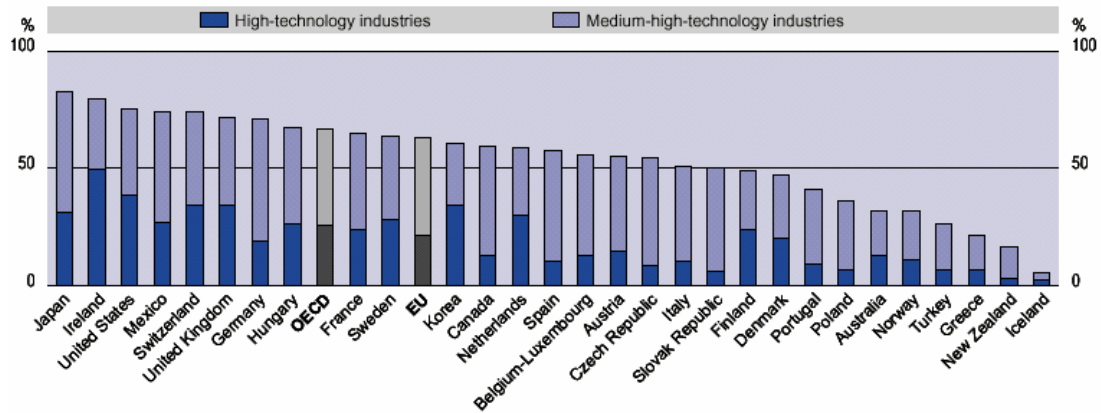
* European Union does not include Luxembourg. OECD does not include Luxembourg, Poland and Turkey.

HT – high technology manufacturing; MHT – medium-high-technology manufacturing

Source: *STI Scoreboard 2001*, OECD 2001, p. 125.

²¹ Three first industries between 1990 and 1999 had the highest growth rates in OECD manufacturing trade. Other groups of industries by technology intensity (according to OECD): medium-high-technology – electrical machinery, other transport, motor vehicles, metal products, shipbuilding, non-metallic minerals, basic metals, petroleum refining; medium-low-technology – rubber, plastics, chemicals, machinery, equipment; low-technology – other manufacturing, wood, textiles, clothing, food, drink, tobacco, paper, printing.

Figure 2. Share of high- and medium-high-technology industries in manufacturing exports, 1999



Source: *STI Scoreboard 2001*, OECD 2001, p. 131.

High-technology industries represented also around 50% of manufacturing exports in Ireland, compared with 38% in the United States, 35% in Switzerland, and 32% in Japan.²²

Poland's performance as compared with other OECD countries is not promising, as far as potential for further economic development is concerned. Hungary and the Czech Republic, and even the Slovak Republic accounted better position in presented technology index (figure 2) than Poland. It means that technological gap – the digital divide, between some countries and Poland deepened (see also table 1).

The knowledge-based industries (KBE) are defined by OECD (based on ISIC Revision3) as the sum of:

- High-technology industries (2423 + 30 + 32 + 33 + 353),
- Medium-high-technology industries (24 excl. 2423 + 29 + 31 + 34 + 352 + 359),
- Post and Communications (64),
- Finance and insurance (65-67),
- Business services (71-74).

KBE are the sum of knowledge industries (two first) and knowledge services (three last). However OECD names it as the knowledge-based industries, they refer also to services and

²² *STI Scoreboard 2001*, OECD 2001, p. 130.

may be an approximation of the fourth sector. Below I will present the share of it in business sector value added in chosen OECD countries in late 1990s (table 3).

Table 3. Share of the knowledge-based industries in total business sector value added

		Total knowledge-based industries		Tech-intensive manufacturing			Knowledge-intensive services		
				TOTAL	of which: High-technology industries	of which: Medium-high technology industries	TOTAL	of which: Post and telecommunications	of which: Finance, insurance and other business services
Canada	(e), (f), (g)	1997	31.8	7.0	1.7	5.3	24.7 ³	3.0	21.7 ³
United States		2000	29.6 ¹	7.8	3.5 ¹	4.3 ¹	21.8	3.4	18.3
Japan		1998	24.4	10.8	3.6 ¹	7.2 ¹	13.6	1.9	11.8
Czech Rep.	(i)	1999	25.0	9.3	1.5	7.8	15.7	3.3	12.4
France		1999	27.2	7.6	2.5	5.1	19.5	2.2	17.4
Germany	(i)	1999	31.7	11.7	- ¹	- ¹	20.0	2.4 ¹	17.6 ¹
Greece		1999	11.9 ¹	1.7	0.5 ¹	1.2 ¹	10.2	2.3	7.8
Hungary		1999	26.2 ¹	10.5	3.5 ¹	7.0 ¹	15.7	3.9 ¹	11.8 ¹
Ireland	(g)	1998	39.2 ¹	16.6	7.7 ¹	8.9 ¹	22.6 ^{1,3}	2.6 ¹	19.9 ³
United Kingdom		1999	28.3 ¹	7.8 ¹	2.9 ¹	4.9 ¹	20.5	3.0	17.5
European Union	(j)	1998	26.0	8.5	1.8 ²	5.8 ²	17.5 ³	2.3	15.2 ³
Total OECD	(k)	1997	26.2	8.8	2.1 ²	5.6 ²	17.4 ³	2.6	14.8 ³

Notes:

(e) HT industries do not include Medical, precision & optical instruments (33).

(f) Finance, insurance & business services does not include Renting of machinery & equipment (71).

- (g) Real estate activities are included in the knowledge based services.
- (i) MHT industries include Building & repairing of ships and boats (351).
- (j) Estimate. Regroups Austria, Denmark, Finland, France, Italy, Spain, Sweden and the United Kingdom. For percentage shares of value added, includes also Germany and Ireland up to 1991, and Belgium up to 1995.
- (k) Estimate. Includes the EU countries, Canada, Japan, Korea, Mexico, Norway and the United States. For percentage shares of value added, includes also the Czech Republic up to 1990 and Hungary up to 1992.

Details for figures:

1. Trend estimates to extend time coverage.
2. Underestimated.
3. Overestimated.

Source: *OECD Science, Technology and Industry Outlook 2002*, OECD, Paris 2002, p. 286.

In most ITC developed countries knowledge-based subsectors contribute to more than ¼ of total business sector value added. There are some exemptions (Greece, Portugal, Spain).

Knowledge-based industries and services have grown from 45% in 1985 to 50% in late 1990s in OECD-wide GDP. The United States is the largest provider of scientific and technological knowledge in the OECD area, and EU is still lagging (however the Nordic countries performed well in the 1990s). In the decade to 1995, share of high-technology manufacturing production and exports in OECD more than doubled, reaching 20-25%. In 1995 investment in knowledge accounted 8% of OECD-wide GDP. More than 14% of the OECD-area labour force had university-level education²³. The phenomenon of the knowledge-based economy emergence and development has also its reflections in changes of employment patterns: in the European Union the share of employment in knowledge-based industries (KBE) accounted in 1999 for 20.0%, in OECD 18.5%.²⁴

4. Conclusions

The main conclusion should be that despite some differences among the presented (table 3) OECD countries, the share of the 'new economy' subsectors (or knowledge-based sectors)

²³ *The Knowledge-Based Economy: A set of facts and figures*, OECD, Paris 1999.

²⁴ *OECD Science, Technology and Industry Outlook 2002*, OECD, Paris 2002, p. 287.

is very large. They substantially contribute to the economic growth and moreover – their share in overall economy increases, too.

In my concept digitalism is a system, basis of which is a digital economy, also described as the knowledge-based (or new) economy. Contemporary changes in most technologically advanced countries show the structural changes in economy and society. These changes also involves the matters connected with the activities of different organs of government (concepts of e-government). It also influences the changes in an economic policy making, influenced by new technology development and their influence on economic development (the need for ‘new economic policy’²⁵). Those changes concerning both economy and economic policy in order to stimulate the economic growth should be introduced also in Central and Eastern Europe.²⁶ Without introducing technological policy, the digital divide will separate Poland from the rest of the modern, better-developed and more technologically advanced European countries.

„Faced with the challenges of the new knowledge-driven economy, the European Union is entering a phase of economic and social transformation.”²⁷ It was not fully shown on the figures presented above, but it is a fact, that Poland is lagging behind many other countries in terms of the knowledge-based economy development²⁸, there is a need for new policies to build-up the knowledge-based economy and to enter a next phase of economic transition. Poland should enter the second stage of transition from post-communist economy to the knowledge-based one as soon as possible. The task of macroeconomic policy is to contribute to achieving this goal²⁹ and to enter digitalism. Together with EU and EMU entrance, they are key challenges for economic development of Poland and other CEECs in this decade.

²⁵ K. Piech, *Uwarunkowania doktrynalne polityki internetowej państwa a polityka gospodarcza*, „Polityka Gospodarcza” 2000, no 4, p. 177-189.

²⁶ K. Piech, *Competitiveness of Central and East European Countries and Economic Policy towards Transition to Digitalism* in: K. Piech (ed.), *Economic Policy and Growth in Central and East European Countries*, School of Slavonic and East European Studies – University College London, London 2002 (forthcoming).

²⁷ *Towards a knowledge-based Europe: The European Union and the information society*, European Commission, October 2002, p. 3.

²⁸ See for example: M. Srholec, *Technological change and evolutionary approach to the catching up process of transition economies*, in: K. Piech (ed.), *European Economy: Opportunities of Change*, The Knowledge Institute, Warsaw 2002, pp. 93-99.

²⁹ Z. Sadowski, *Znaczenie polityki makroekonomicznej we współczesnej Polsce*, w: K. Piech (red.), *Przemiany i perspektywy polityki gospodarczej*, Polskie Towarzystwo Ekonomiczne, Warszawa 2001.

Bibliography

1. Aghion P., P. Howitt, Endogenous Growth Theory, MIT Press, Cambridge, Massachusetts and London 1998.
2. Balcerowicz L., Systemy gospodarcze. Elementy analizy porównawczej, Warszawa 1989.
3. Bieńkowski W., Polityka ekonomiczna i jej wpływy na konkurencyjność gospodarki we współczesnym świecie. Wnioski dla Polski, in: J. Bossak, W. Bieńkowski, Konkurencyjność gospodarki Polski w dobie integracji z Unią Europejską i globalizacji, part I, Instytut Gospodarki Światowej SGH, Warsaw 2001.
4. Drucker P., Post-Capitalist Society, HarperCollins, New York 1993.
5. European Commission, Towards a knowledge-based Europe: The European Union and the information society, October 2002.
6. Hermann A., Wirtschaftspolitik und Regierungssystem der Bundesrepublik Deutschland. Eine Einfuehrung, Bundeszentrale fuer politische Bildung, Bonn 1995, 3. Auflage.
7. Kaja J., Polityka gospodarcza. Wstęp do teorii, Oficyna Wydawnicza SGH, Warszawa 1999.
8. Kaja J., X. Yu, Two roads, one goal – the comparison of Polish and Chinese administrative reform, „Polityka Gospodarcza”, no. 3, June 2000, p. 17-24.
9. Kołodko G., „Nowa gospodarka” i stare problemy, in: G. Kołodko (red.), „Nowa gospodarka” i jej implikacje dla długookresowego wzrostu w krajach postsocjalistycznych, Wydawnictwo Wyższej Szkoły Przedsiębiorczości i Zarządzania im. Leona Koźmińskiego, Warszawa 2001.
10. Kołodko G., Globalizacja a perspektywy rozwoju krajów postsocjalistycznych, TNOiK, Toruń 2001.
11. Kornai J., What the change of system does and does not mean?, paper for the conference Evolution et transformation des systems economiques, Paris 19-20 June 1998.
12. Kowalik T., Współczesne systemy ekonomiczne. Powstawanie, ewolucja, kryzys, Wydawnictwo Wyższej Szkoły Przedsiębiorczości i Zarządzania im. Leona Koźmińskiego, Warszawa 2000.
13. Machlup E., The Production and Distribution of Knowledge in the United States, Princeton University Press, Princeton 1962.

14. Malecki E., *Technology and Economic Development: The Dynamics of Local, Regional and National Competitiveness*, 2nd edition, Longman, Essex 1997.
15. OECD, *OECD Science, Technology and Industry Outlook 2002*, Paris 2002.
16. OECD, *STI Scoreboard 2001*, Paris 2001.
17. OECD, *The Knowledge-based Economy*, Paris 1996.
18. OECD, *The Knowledge-Based Economy: A set of facts and figures*, Paris 1999.
19. OECD, *Understanding the digital divide*, www.oecd.org/dsti/sti/prod/Digital_divide.pdf.
20. Piech K., *Competitiveness of Central and East European Countries and Economic Policy towards Transition to Digitalism*. in: K. Piech (ed.), *Economic Policy and Growth in Central and East European Countries*, School of Slavonic and East European Studies – University College London, London 2002 (forthcoming).
21. Piech K., *Digitalism*, in: K. Piech (ed.), *European Economy: Opportunities of Change*, The Knowledge Institute, Warsaw 2002
22. Piech K., *Etymologiczna i sokratyczna definicja polityki gospodarczej*, „*Polityka Gospodarcza*” no. 5-6, 2001-2002, p. 235-259.
23. Piech K., *Konkurencyjność gospodarki Polski w dobie rewolucji informacyjnej a wejście do Unii Europejskiej*, „*Studia i Prace Kolegium Zarządzania i Finansów SGH*” 2001, no. 22, pp. 17-40.
24. Piech K., *Life-time-learning – konieczność doby rewolucji informacyjnej a polityka edukacyjna państw*, in: A. Zbierchowska (red.), *Kształcenie ustawiczne w warunkach globalizacji i rozwoju społeczeństwa informacyjnego*, Instytut Wiedzy, Warsaw 2002, pp. 121-130.
25. Piech K., *Perspektywy polityki gospodarczej w dobie nowej gospodarki*, [in:] *Wpływ otoczenia na zarządzanie i finansowanie przedsiębiorstw. Część II: Przedsiębiorstwo wobec wyzwań przyszłości*, Warsaw School of Economics, Warsaw 2001, pp. 17-28.
26. Piech K., *Uwarunkowania doktrynalne polityki internetowej państwa a polityka gospodarcza*, „*Polityka Gospodarcza*” 2000, no 4, pp. 177-189.
27. Piech K., *Wiedza na czas*, „*Computerworld Polska*”, 2001, no. 2, pp. 44-45.
28. Sadowski Z., *Znaczenie polityki makroekonomicznej we współczesnej Polsce*, in: K. Piech (red.), *Przemiany i perspektywy polityki gospodarczej*, Polskie Towarzystwo Ekonomiczne, Warsaw 2001.
29. Schwartz P., *'Post-Capitalist'*, *Wired*, Issue 1.03 – July/August 1993.

30. Srholec M., Technological change and evolutionary approach to the catching up process of transition economies, in: K. Piech (ed.), *European Economy: Opportunities of Change*, The Knowledge Institute, Warsaw 2002, pp. 93-99.
31. Woll A., *Allgemeine Volkswirtschaftslehre*, 10. Auflage, Verlag Franz Vahlen, Muenchen 1990.