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INTANGIBLE ASSETS IN THE POSTINDUSTRIAL ECONOMY: MYTHS AND REALITY

Abstract. The purpose of the article is to determine the role and the place of the intangible assets in the postindustrial economy. The points of view of different scientists about the formation and development of the postindustrial economy from the position of globalization have been checked and the main unsolved controversies, which are observed in the process of its development, have been analyzed. The faultiness of some theses, from the position of the critical analysis, about the influence of some intangible assets on the macro and micro-indicators of the postindustrial society in general and the separate enterprises, in particular, has been proved. Based on the statistic data of the countries' economies of the Organization of Economic Cooperation and Development (OECD) the thesis about fast effectiveness and financial feedback from the implementation of the intangible assets has been simplified. The complexity of the dimension of the financial feedback of the intangible assets is in that the results of their implementation into the production process in many cases has intangible character, which is not connected with the creation of the final product of consumption (creation of the organization capital, human capital, etc). R. Sollow's paradox hypothesis as to information technologies has been proposed to be broadened by the on other types of intangible assets. The accountant legislature of different countries has been analyzed and it has been determined that the number in investments in the performance of the *research and development* (R&D) might influence the amount of the intangible assets in different ways. The results of the leading world corporations' assets analysis, working in different areas, have been presented in the article. For this purpose, the structure of their balances for 2018 has been analyzed and it has been determined that intangible assets do not occupy the dominant part in the overall general assets.

Keywords: intangible assets, postindustrial economy, *R&D*, productivity, asset structure in the balance sheet.

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НЕМАТЕРІАЛЬНІ АКТИВИ В ПОСТІНДУСТРІАЛЬНІЙ ЕКОНОМІЦІ: МІФИ І РЕАЛЬНІСТЬ

Анотація. Мета статті — розгляд ролі та місця нематеріальних активів у постіндустріальній економіці. Проаналізовано погляди різних учених на формування і розвиток постіндустріальної економіки з позицій глобалізації та визначено основні неврегульовані суперечності, які спостерігаються на шляху її розвитку. З позиції критичного аналізу спростовано хибність деяких тез щодо впливу нематеріальних активів на макро- і мікроекономічні показники економіки постіндустріального суспільства в цілому та окремих підприємств зокрема. На основі статистичних даних економіки країн Організації економічного співробітництва і розвитку (ОЕСД) спростовано тезу про швидку ефективність і віддачу від упровадження нематеріальних активів. Складність виміру віддачі нематеріальних активів полягає у тому, що і результати їх залучення у виробничий процес здебільшого матимуть нематеріальний характер, який не пов'язаний із створенням кінцевого продукту споживання (створення організаційного капіталу, людського капіталу тощо). Запропоновано розширити гіпотезу парадоксу Р. Соллоу стосовно інформаційних технологій на інші види нематеріальних активів. Проаналізовано бухгалтерське законодавство різних країн і визначено, що розмір інвестицій на здійснення НДДКР можуть по-різному вплинути на величину нематеріальних активів. Представлено результати аналізу активів провідних світових корпорацій, які працюють у різних галузях. Для цього проаналізовано структуру їхніх балансів за 2018 рік і визначено, що нематеріальні активи насправді не займають домінуючої частки в сумі загальних активів.

Ключові слова: нематеріальні активи, постіндустріальна економіка, НДДКР, продуктивність праці, структура активів у балансі.

Формул: 0; рис.: 1; табл.: 3; бібл.: 18.

Introduction. Nowadays the theory of the postindustrial society and the economy is one of the dominant among the social, philosophic and economic concepts, wherein their basis there is an idea of rethinking the technological role of progress in the transformation of modern society.

The theorists of the postindustrial society consider the substitution of the mechanic interaction by the electronic technologies to be the peculiarity of the modern science-technical progress. The development of the above-mentioned technologies is so rapid that in the last years according to the Law of Mur the amount of the transistors on the integral scheme is doubled every two years.

Postindustrial economy is observed as a reality which has already come and things which had been predicted by the developers of the abovementioned theory (the dominance of the service sphere over the material production, massive transition of labour resources from the industry into the service sphere, the leading role of the technological progress in the world economic changes, the influence of the information technologies on the growth of the labour efficiency and the shortages of the transaction costs, etc) completely came into being in the world developed countries back in the middle of the XX century. The implementation of the abovementioned theory was accompanied by the numerous myths and exaggerations, which were created by its followers and featured the achievements of the abovementioned conception only in one way, ignoring the facts of the real state of affairs in economy and society.

Analysis of research and problem statement. The review of the literature shows that the scientists observed the theory of postindustrial society from different positions. One of the founders and developers of this theory D. Bell [1] formed the main characteristics, which have to certify the transition of the society into the epoch of the postindustrial economy. He has also defined that main statement, which should determine the functioning of the economy. Although it must be taken into account, that the first edition of D. Bell's book was issued in the distant 1973. The conditions, in which the modern economy is functioning, have cardinally changed since that time that is why some statements are understood as too ideal. The author pays little attention to the post-industrialism controversies, besides the role and the place of the intangible assets that have not been

observed in the economy of the enterprises. V. Inozemcev, V. Yakunin, S. Sulakshyn, V. Bagdasarian, S. Kara-Murza, M. Deeva, Y. Safonova, Y. Pyriutko, E. Vorobjov, T. Demchenko [2—5] in their works, critically analyzed the concept of the postindustrial economy from the position of the globalization and determined the main unsolved contradictions, which are observed on the way of its development on the macro level. The main unsolved question was the substantial change in the development of the «gold billion» countries' economies and the countries' economies of the third world. P. Alekseev and V. Feldbloom [6; 7] focused on the social aspect of the development of society in the post-industrial era and identified the reasons for the redistribution of labor resources between different industries and regions. All of the above-mentioned authors paid more attention to the macroeconomic aspects of the post-industrial economy era, while E. Brynjolfsson, D. Rock, C. Syverson [8] proposed to search for solutions to the macro level contradictions, exploring the impact of modern technology on the productivity of leading companies in the world.

N. Bloom, I. Charles, J. Van Reenen, and M. Webb [9] in their works distinguish factors that distort research, related to the impact of intangible assets on the growth of economic performance of enterprises. T. Holzheu [10] analyzed the question of balance sheets structure and the place of intangible assets in them, but the author refers to all assets, which do not have the material form, to the sphere of intangible assets, and this faulty thesis is present in other scientific works too. A general review of the literature shows that the question of the place and role of intangible assets in economic processes in the enterprise requires more in-depth research.

Research results. Understanding that modern society can and should be seen as postindustrial has been proved by the followers of postindustrial theory based on an analysis of the logic of the development of civilization. The basis of such research was an abstract idea of isolating the various stages of the technological revolution, which were supplemented by representatives of the institutionalism direction in economic theory. Proponents of the postindustrial theory claim that three sufficiently large epochs were in history, forming the triad of «pre-industrial-industrial-post-industrial society».

According to V. Inozemtsev, this scheme allows formulating a well-known thesis about three societies, according to which industrial society is based on human interaction with nature, industrial — on interaction with transformed nature, and postindustrial – on the interaction between people [2, p. 15].

R. Darendorf's theory also fits this scheme, according to this theory different epochs of the mankind existence were characterized by different mentality: Homo Faber (working person) for agrarian pre-industrial society; Homo Universalis (Universal person) for the industrial society; Homo Consumer (consuming person) for post-industrial society. It is for the post-industrial society that growth in incomes, education and leisure time among most sections of the population becomes characteristic. A new social community begins to play a leading role [11, p. 29].

New technologies, which are the embodiment of intangible assets, begin to bring about significant shifts in the structure of the economy and increase its efficiency. This is achieved by increasing output while reducing the cost of production.

If in the post-industrial economy the initial capital was the main source of production capacity purchasing, then in the post-industrial economy the initial capital is invested, first of all, in various types of intangible assets in the form of property rights for resources, patents, licenses, etc. Intangible assets also influenced the form of raising start-up capital: if in the pre-industrial and industrial economy the shareholders' money was involved in specific tangible projects, then in the post-industrial economy, the availability of unique know-how (patents for production of production know-how) become the most important factor for investors services), and the projects themselves may be social (such as social networks).

Proponents of the post-industrialism claim that at this stage of economic relations development, information and knowledge become the main resource. Scientific works become a major driving force of the economy. The most valuable qualities are the level of education, professionalism, and creativity of the employees. Post-industrial countries are usually referred to as those where the service sector accounts for more than half of GDP [7].

In the United States, for the period from 1970 to 2016, the share of services increased from 39.2% to 55.4% (*Table 1*). If we also include trade here, the share will be even greater.

Table 1

Structure of the US economy, (1970—2016), %

Industry branch	1970	1980	1990	2000	2010	2016
Agriculture (%)	2,4	2,0	1,5	0,96	1,1	0,95
Industry (%)	27,3	26,3	21,6	18,2	16,5	14,9
Construction (%)	4,9	4,6	4,2	4,5	3,6	4,3
Trading (%)	16,6	15,9	15,2	15,6	14,3	14,8
Transport (%)	9,8	9,8	8,9	9,3	9,4	9,7
Services (%)	39,1	41,4	48,6	51,4	55,1	55,4

Sources: [12].

In 2019—2020, the service sector occupies a dominant position in the US economy [13].

However, not paying attention to these figures, one does not have to speak about the unequivocal victory of all the basic tenets of the postmodernism theory. The influence of most elements of this theory is ambiguous and often exaggerated.

Let's consider the basic myths about the post-industrial economy that are associated with intangible assets.

Myth 1. The increase of investments into the intangible assets (know-how, patents, and intellectual property rights) is a major driver of the post-industrial economy.

Nowadays, the increase in investments in intangible assets has contributed to the emergence of new products (services) that are in demand in society. This is especially true for the pharmaceutical industry and the production of medical equipment. And it is indisputable that such know-how is a benefit to the economy. However, not all intangible assets can fully contribute to this.

Analyzing the impact of information technology on the economy, researchers have encountered the so-called R. Sollow's paradox, a concept introduced by the American economist, Nobel Prize winner of the year 1987. The essence of this hypothesis was that investment in computerization of production processes, on the one hand, did not lead to increased profits or improved productivity, and on the other — led to even greater investments into computer technology.

And statistic data confirm this. According to the most approximate estimates, at the end of the 20th century, revenues from the automation of routine tasks were, according to official statistics, about \$ 80 to \$ 400 billion a year. However, these savings did not cover even half the cost of maintaining and using information technology. Between 1983 and 2000, the number of specialists, recruited to serve information technology, increased to 17.3 million. The maintenance costs to the salary fund increased to 84-160%. At the same time, only 6.8 million employees were the result of job expansion [14].

Concerning other intangible assets, the situation is largely ambiguous.

Between 2012 and 2016, the high-tech Nasdaq stock index more than doubled. According to the SV Insights Information Platform, which analyzes millions of data on technology, venture capital, startups, global investment has grown even faster, rising from \$ 589 million in 2012 to over \$ 5 billion in 2016 [15].

However, this increase in investments in intangible assets had little effect on the aggregate statistics of productivity. The labor productivity growth rates in advanced economies declined in the mid-2000s and remained low since then. For example, the overall productivity growth of the USA was only 1.3% per year from 2005 to 2016, which is less than half of the 2.8% annual growth rate, which had been observed from 1995 to 2004. This situation is also characteristic of other regions. Thus, studies have shown that for the period from 1995 to 2004 in 28 countries of the Organization for Economic Cooperation and Development (OECD) the average annual labor productivity growth rate was 2.3%. However, between 2005 and 2015, they declined to 1.1%. The real average income

for most population groups in these countries had not been increased since the late 1990s. The Congressional Budget Office reduced the 10-year forecast for average annual productivity growth in the USA from 1.8% in 2016 to 1.5% in the future. The GDP of the USA for 10 years will be much smaller than it would have been under a more optimistic scenario — a difference equivalent to almost \$ 600 billion in 2017 [8, p. 4].

Thus, we see the extension of R. Sollow's paradox, except information technologies, to other groups of intangible assets. Is such pessimism justified and objective?

Some researchers, believe that the slowdown in productivity growth is explained by the decrease in productivity research of this phenomenon. Also, too little time is taken as a basis. Labor productivity should be investigated not from the macroeconomic point of view, to address the micro-level, involving a large number of firms in the statistic sample [9].

We believe that another explanation for this paradox is the incorrect methodological approach to measuring results. In this case, it is a pessimistic interpretation of the empirical past, not optimism about the future, which is characterized by a high degree of uncertainty and nonlinearity of development. The complexity of measuring the return on intangible assets is that the results of their involvement in the production process in many cases will be intangible, which is not associated with the creation of the final product of consumption (creation of organizational capital, human capital, etc.).

Myth 2. The growth of intangible assets leads to the fact that in the post-industrial economy, the number of employees in the service sector exceeds the number of employees in the sphere of production.

According to the theory of post-industrial society, an increase in the share of employment services was made possible by technological advances that allowed the release of labor resources from material production. This is an objective process as the roboticization and automation of industrial production made it possible to reduce a significant number of workers.

According to some data, in the mid-twentieth century, the United States in the service sphere employed as many workers as it did in industry and agriculture. By the 1990s, the situation changed dramatically: about 18% of the employed population worked in the industry, almost 80% in the service sector and 2—3% in agriculture [6].

However, other studies indicate that due to the specifics of US statistical methods, the service sector has been artificially «overloaded» by the employees. Thus, according to other data for March 2006, of the total number of people employed in the sector of «service production», 83.6% of the total number of employees were working in the sphere of agriculture. This state of affairs is explained by the exclusion of the personnel from the industry of management and engineering sphere, which was defined as representatives of different branches of services. If we exclude other manipulations with figures, according to official data for 2006 in the sectors of material production of the USA there were 81 374 thousand people from 134 868 thousand people or 60,3% (excluding agricultural workers). In the United States for the period from 1948 to 1997 statistics suggests that, in terms of employment, the industry has given way, not to information services but the public sector and public administration [4, p. 26; 16, p. 14—16].

However, the fact becomes evident that there is an increase in the number of people employed in the service sector (which has not yet become the dominant one). But this situation is characteristic only of the countries of the «golden billion» and is explained by their geo-economic position. Established within the international system, the model of division of labor involves the deployment of the financial and service sector in the new metropolises, and industrial and agricultural — in the third world.

A very low level of production costs in Asian and Latin American countries makes it more advantageous to place production facilities there. The exception is the production of unique and defense technologies — such as the production of aerospace products in the US and the EU.

Due to the numerous expansions of the financial services, the market creates the illusion of domination of the service industry. Despite its isolation, the existence and functioning of trading and financial capital are conditioned by material production. A virtual economy cannot exist without the real sector [5, p. 91].

It is the massive flow of capital from industrial to financial that makes post-industrial theory vulnerable. Because of these objections, post-industrialism is not a common mandatory development phase for all countries.

Myth 3. In the balance sheets of post-industrial economies, the share of intangible assets outweighs the share of tangible ones.

In the numerous publications on the role and share of intangible assets in the aggregate of enterprise assets figures from the intellectual property bank, Ocean Tomo has become popular [17]. Fig. shows the percentage of tangible assets that vary by industry.

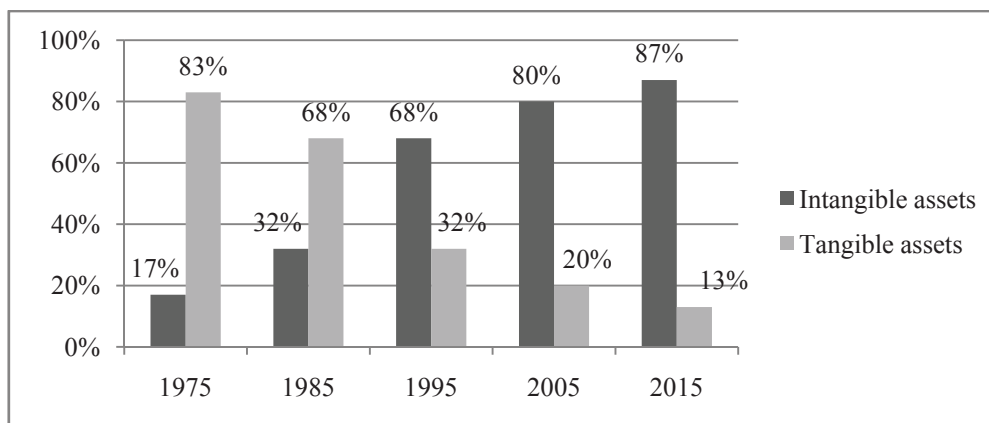


Fig. Share of tangible and intangible assets in the market value of S & P 500 companies, 1975—2015

Sources: [10].

However, from our point of view, the interpretation of the above graph is not quite accurate. Citing such data, the authors, talking about «intangible assets» rather mean all the assets that have no tangible form, including funds in the calculations, accounts receivable, etc. To prove this, let us analyze the balance sheets of several global companies for the 2018 year in the production sphere (Table 2).

Table 2

Assets structure in giants of industrial production (31.12.2020)

Structure of assets in the balance sheet	Boeing Co (BA)		Coca Cola Company (KO)		Airbus Group (SE)		British Petroleum (BP)		Sony Corp ADR (SNE)	
	mln \$	Fraction, %	mln \$	Fraction, %	mln \$	Fraction, %	mln \$	Fraction, %	mln \$	Fraction, %
Intangible assets	10196	6,7	28550	34,3	16199	14,7	18573	6,9	15556	6,6
Other non-physical assets	39401	25,9	28161	31,9	27864	25,3	86261	32,2	157023	66,7
Physical assets	102539	67,4	26505	33,8	66032	60,0	162820	60,9	62704	26,7
Result	152136	100	83216	100	110095	100	267654	100	235283	100

Note. Compiled by the authors, based on sources: Balance sheet (Boeing Co (BA), Coca Cola Company (KO) Airbus Group (SE) British Petroleum (BP), Sony Corp ADR [18].

These tables' data show that the share of intangible assets is in the range of 9,6% to 20,8% and tangible assets still dominate the intangible assets in the classical sense of the word. Although we have selected only five global companies, the giants of industrial production and processing, this state of affairs is typical for others — the value of intangible assets is in the range from 5 to 20% in the structure of all balance assets, but no more than 80% as it is shown in other studies.

Let's consider the asset structure of the world's giants now, whose business is based on the use of know-how (Internet commerce, software production, social networks, and search engines) (*Table 3*).

Table 3

Balance sheet assets of the largest digital companies (31.12.2020)

Structure of assets in the balance sheet	Alphabet Inc Class A (GOOGL)		Alibaba Group Holdings Ltd (BABA)		Amazon.com Inc (AMZN)		Microsoft Corporation (MSFT)		Facebook Inc (FB)	
	mln \$	Fraction, %	mln \$	Fraction, %	mln \$	Fraction, %	mln \$	Fraction, %	mln \$	Fraction, %
Intangible assets	22620	7,1	55737	22,5	15017	4,7	50774	16,7	19673	12,3
Other non-physical assets	62614	19,6	122452	49,4	89594	27,9	174972	57,5	78174	49,1
Physical assets	234382	73,3	69579	28,1	216584	67,4	78391	25,8	61469	38,6
Result	319616	100	247768	100	321195	100	304137	100	159316	100

Note: Compiled by the authors, based on sources: Balance sheet Alphabet Inc Class A (GOOGL), Alibaba Group Holdings Ltd (BABA) Amazon.com Inc (AMZN) Microsoft Corporation (MSFT). Facebook Inc (FB) [18].

Oddly enough, but in these companies too, the density of intangible assets share does not exceed 20% in the overall balance sheet structure. Although the proportion of physical assets is much lower here than in *Table 2*, there is also no total dominance of intangible assets.

Therefore, it can be argued that, despite the leading role of intangible assets in the activities of large companies in different sectors of the economy, their share is not dominant in the total value of the assets of the balance sheet.

The international practice has developed several approaches to how intangible assets should be reflected in the classical sense of the word in accounting and balance sheet. Thus, countries, where GAAP rules apply (USA, Canada), apply SFAS Regulation № 2 «The R&D Cost Accounting». These rules stipulate that expenses, incurred for the creation of intangible assets, should be written off in the current period without their capitalization. This rule does not apply to cases where such assets were created for transfer to another party.

In EU countries, where IFRS rules apply, accounting R&D costs are regulated by the Standard (IAS), 38 «Intangible Assets», which states that R&D costs can be capitalized if an entity is able to complete its intangible assets creation, use (or sell) and such assets will bring economic benefits in the future. In this way, internally generated intangible assets in some countries will be reflected in the balance sheets of companies and other countries will not. This makes it somewhat difficult to benchmark the intangible assets in the balance sheets of different companies, but it may not affect the overall trend, as not all companies develop such assets for their own needs. Besides, the budget for such research is small enough compared to other areas of the investment policy.

Conclusions. According to the research, today it is impossible to talk unequivocally about the onset of the post-industrial economy in its purest form, as it was seen by the founders of this theory. Postindustrialism as a conception is more like a theoretical model, whose task is to predict possible options for the development of macroeconomic processes. The analysis of the place and role of intangible assets in the post-industrial economy has revealed the faultiness of several theses. Growth in investment in intangible assets is only a tangible, but not a basic, condition for the dominance of manufacturing services. The main reason is, first and foremost, the global distribution of labor and the flow of industrial capital into regions with lower production costs. The total dominance of intangible assets in the balance sheets of leading companies in different industries is an exaggeration. We can only agree with the thesis that assets without a physical form begin to dominate. Besides the intangible assets in the classical sense of the word, we can also add here the assets in the calculations, accounts receivable, financial instruments.

Increasing the volume of intangible assets, involved in economic processes, does not always lead to a noticeable increase in labor productivity and is often a confirmation of the Sollow's Paradox, which goes beyond information technology. However, we believe that genuine research on this issue should include a different methodological toolkit, a larger time interval, and a larger sample size than has been done in the past. It is also necessary to change the research methodology itself since many intangible assets result in the formation of an intangible result (such as the creation of competitive advantages), which is often unpredictable by the accounting standards.

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