The economic meaning of 'intangible capital' (according to World Bank research)

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THE ECONOMIC MEANING OF 'INTANGIBLE CAPITAL' (ACCORDING TO WORLD BANK RESEARCH)

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Annotation

In the following article, it will be proven on the basis of correlation analysis that 'intangible capital,' interpreted by the World Bank as both human capital and the quality of the institutions supporting economic activity, in fact represents the actual capacities of a given country to export non-commodity goods. The significant amount of 'intangible capital' found in highly developed countries lies in sharp contrast to the relatively smaller amount found in Russia; explained by its colonial-type trade system and the multiplier effect of added value.

Key words: intangible capital, national wealth, added value, unequal exchange, export of raw materials

1. The expansive 'national wealth' concept of the World Bank

At the end of the 1990s World Bank experts developed a technique of national wealth structure analysis as an experiment and managed to estimate the roles of its separate elements in highly- and poorly-developed countries (*Kunte, Hamilton, Dixon, Clemens, 1998)*. Its treats 'national wealth' as a set of three components: natural capital (i.e. natural resources), produced capital (i.e. basic industrial and non-industrial funds, working capital, domestic property) and human resources. In later research *(Where Is the Wealth of Nations, 2006,)* the term 'human resources' was replaced by the term 'intangible capital.' World Bank experts understand 'intangible capital' as human capital (i.e. the sum of knowledge, skills, and know-how possessed by a population), and it correlates with the quality of formal (i.e. institutional infrastructure, the judicial system, strictly fixed rights of property) and informal institutions (i.e. social capital - the level of trust among people in a given society and their ability to collaborate toward common goals). Their research proves that, "rich countries are largely rich because of the skills of their populations and [the] quality of the institutions supporting economic activity" *(Where Is the Wealth of Nations, 2006)*.

The method the World Bank used was focused on cross-country comparisons; for this reason, its authors made a number of serious simplifications. The total wealth estimates are built upon a combination of top-down and bottom-up approaches. A mixture of various estimation techniques of national resource elements is one of the serious drawbacks of their approach; though within the framework of the system of national accounts, it is acceptable. Total wealth, in line with economic theory, is estimated as the present value of future revenue. Produced capital stocks are derived from historical investment data using a perpetual inventory model (PIM). Natural resource stock values are based upon country-level data on physical stocks and estimates of natural resource rents based on global prices and local costs. The period of natural resource exhaustion was defined on the basis of known natural resource stocks and the dynamics of natural resource extraction, providing the maximal constant flow of incomes. If the stock rate was not known, the conditional term of an exhaustion of stocks in 20 years was assumed. Incomes of oil, gas, iron ore, lead, nickel, phosphorite, zinc and tin extractions were additionally considered. The estimates of natural wealth are limited by the available data. Natural resource assets for which data are lacking include subsoil water, diamonds, and fisheries.

'Intangible capital' is calculated as a residual, *viz.* the difference between national wealth and the sum of produced and natural capital: from the total amount of net national income (NNI) the contribution of national natural resources (the natural resources rent) was subtracted; then the net present value "not on the resource basis" of NNI for the population's average productive life-years (life expectancy minus the average age of the population). The sum of activities and the grounds value was subtracted from the result. The result of these operations has also been accepted as an estimate of 'intangible capital.' Since it includes all assets that are neither natural nor produced, the residual necessarily includes human capital, the institutional infrastructure as well as social capital. The collective value of the subsoil water, diamonds, and fisheries is included in the total wealth aggregate and thus ends up in the 'intangible capital' residual. The residual also includes net foreign financial assets through the returns generated by these assets. For example, if a country is a debtor, then interest payments on that foreign debt depress consumption, reducing total wealth and therefore the intangible residual. Finally, the 'intangible capital' formula includes mistakes and omissions in estimating natural and produced capital (e.g. subsoil water or fishery) *(Where Is the Wealth of Nations, 2006)*.

The problem with which World Bank experts dealt was very complex and solving it without serious simplifications is hardly ever feasible. Though simplifications also result in some distortion of the final result, they are necessary and inevitable in this case. The most complicated problem is the estimation of

'intangible capital' and its primary component - human capital, the value of which cannot be estimated in the traditional way (like estimating commercial enterprise assets.) Obviously, new methods are needed. In terms of cross-country comparisons, the indirect parameters describing the development of science and education could give the most relevant picture; as examples: the share of a given population with a higher education, the number of the patents granted per million persons, the number of scientists and engineers per million persons. However, there is a question: how to transform these parameters into value indicators with which to calculate the total wealth of a given country?

When estimating human capital, scientists usually take into consideration two positions – "cost-based" and "profitable." On the one hand, calculating human capital value is defined by the result of the accumulation of investments in developing the person as a future worker during all stages of one's life cycle (cost-based approach). On the other hand, estimating human capital can also be based on the method of income capitalization; in that case, wages which are compensation for human efforts upon the realization of professional skills is meant (profitable method).

Both approaches are not devoid of inherent drawbacks. The "cost-based" method does not take into account the efficiency of investments in human capital. Equal expenses may have varying results, and equal results may require varying expenses: this can be explained by the differences among persons' abilities. For example, for the equivalent cost of training in college, knowledge and skills can essentially differ among the many graduates; this is explained by their differing levels of ability and discipline. It is necessary to note that when we deal with cross-country comparisons, the cost of training of comparable specialties in different countries can vary greatly because of differences in payment and the prices for goods and services.

The use of the "profitable method" by experts of the World Bank was also worthwhile. In this case the human capital is understood only as knowledge and skills; those which are involved in the manufacturing process and take part in the creation of 'surplus value,' (i.e. the potential of human capital is not considered.) However, worker knowledge and skills remain largely unapplied for reasons independent of one. For example, liberal-market reforms in Russia resulted in a 40% drop in GDP by 1998 in comparison to the pre-reform level; many enterprises have shut down or worked well under their capacities. Under these conditions, a large number of highly skilled experts were unemployed, in particular in a manufacturing industry mostly affected by crisis. Therefore, by itself, the unappreciated value of human capital has not yet demonstrated a low level of scientific and educational development in the country.

Another problem is that the wages of equal qualification work can differ in

the different countries greatly. Experience shows that immigrants from Mexico, who were earning USD $31 on average per week in their homeland, start to earn about USD $278 per week at once after arriving in the USA. It turns out, that the value of human capital is mostly determined, not by internal, but rather by external factors. As there is no united global market of labor in which workers of one specialty could freely compete with each other for the best conditions and wages, use of the "profitable method" in cross-country comparisons is not quite correct and does not yield objective information about human capital as knowledge and skills.

It is obvious that, in understanding the aforementioned drawbacks of the "profitable method," World Bank experts have decided to replace the term 'human capital,' by a more indistinct one 'the intangible capital'.

2. Experimental estimations of national wealth by the World Bank

Experts at the World Bank made experimental estimations of the human, natural and produced capital of 92 countries around the world using data from 1994 and subsequently - 118 countries around the world (including Russia,) in which 5.3 billion people live, using data from 2000. The results of these experimental estimations showed that national wealth sums are very unequally distributed between the countries (tab. 1). In the countries with a level of wealth of over USD $200.000 per capita, 860 million people live. On the other hand, 3.5 billion people live in the countries wherein per capita national wealth is no more than USD $25.000 It shows a rather unequal distribution of available major resources on the planet for the further, steady development of mankind in the 21st century. Ten countries with the highest wealth per capita includes Switzerland (USD $648.000), Denmark (USD $575.000), Sweden (USD $513.000), USA ($512.000), Germany (USD $496.000), Japan (USD $493.000), Austria (USD $493.000), Norway (USD $474.000), France (USD $468.000) and Belgium - Luxembourg (USD $452.000).

Table 1 - Groups of the countries on a level of national wealth per capita, 2000.

National wealth per capita, thousand dollars	The countries
> 600	Switzerland
500-600	Denmark, Sweden, USA
400-500	Austria, Belgium - Luxembourg, Finland, France, Germany,

	Japan, Netherlands, Norway, United Kingdom
300-400	Australia, Canada, Ireland, Italy
250-300	Israel, Singapore, Spain
200-250	Greece, New Zealand, Portugal
150-200	
100-150	Antigua and Barbuda, Argentina, Barbados, Republic of Korea, Seychelles, Saint Kitts and Nevis, Uruguay
75-100	Hungary, Chile
50-70	Belize, Brazil, Costa Rica, Dominica, Estonia, Grenada, Mauritius, Mexico, Panama, Saint Lucia, Trinidad and Tobago, South Africa
25-50	Bulgaria, Botswana, Cape Verde, Colombia, Dominican republic, Ecuador, El Salvador, Fiji, Gabon, Guatemala, Jamaica, Jordan, Latvia, Malaysia, Namibia, Paraguay, Peru, Russian Federation, Romania, Saint Vincent, Surinam, Swaziland, Thailand, Tunisia, Turkey, Venezuela
< 25	Albania, Algeria, Bangladesh, Benin, Bolivia, Burkina Faso, Burundi, Bhutan, Cameroon, Chad, China, Comoro islands, Congo, Cote d'Ivoire, Egypt, Ethiopia, Gambia, Georgia, Ghana, Guinea – Bissau, Guyana, Haiti, Honduras, India, Indonesia, Iran, Kenya, Lesotho, Madagascar, Malawi, Mali, Mauritania, Moldova, Morocco, Mozambique, Nepal, Nicaragua, Niger, Nigeria, Pakistan, the Philippines, Rwanda, Senegal, Sri Lanka, Syria, Togo, Zambia, Zimbabwe

Source: Where Is the Wealth of Nations? Measuring Capital for the 21th Century. The World Bank. Washington DC, 2006.

According to World Bank experts, 77% of global wealth comes from intangible capital, 18% from produced capital, and only 5% from natural capital. The highest value of natural capital per capita is in Norway (USD $54.800), and of produced capital in Japan (USD 150.300), and finally of intangible capital in Switzerland (USD $542.400). Hence, cross-country differences in national wealth per capita are primarily determined by the value of intangible capital (tab. 2).

Table 2 - Groups of countries on a level of intangible capital per capita, 2000.

Size of the 'intangible capital' per capita,	The countries

thousand dollars.	
< 500	Switzerland
400-500	Austria, Denmark, France, Germany, Sweden, USA
300-400	Belgium - Luxembourg, Finland, Italy, Japan, Netherlands, United Kingdom
200-300	Australia, Canada, Greece, Ireland, Israel, Norway, Spain
150-200	New Zealand, Portugal, Singapore
100-150	Argentina, Barbados, Republic Korea
75-100	Antigua and Barbuda, Seychelles, Uruguay
50-75	Brazil, Chile, Hungary, Saint Kitts and Nevis
25-50	Belize, Botswana, Cape Verde, Colombia, Costa Rica, Dominica, El Salvador, Estonia, Fiji, Grenada, Jamaica, Latvia, Mauritius, Mexico, Namibia, Panama, Paraguay, Peru, Saint Lucia, Saint Vincent, South Africa, Surinam, Tunisia, Turkey
10-25	Albania, Bulgaria, Bolivia, Cote d'Ivoire, Dominican republic, Ecuador, Egypt, Georgia, Guatemala, Jordan, Lesotho, Malaysia, Morocco, the Philippines, Romania, Sri Lanka, Swaziland, Thailand, Trinidad and Tobago
0-10	Bangladesh, Benin, Bhutan, Burkina Faso, Burundi, Cameroon, Chad, China, Comoro islands, Ethiopia, Ghana, Gambia, Guinea Bissau, Guyana, Haiti, Honduras, India, Indonesia, Iran, Kenya, Madagascar Malawi, Mali, Moldova, Mozambique, Mauritania, Nicaragua, Niger, Nepal, Pakistan, Rwanda, Russian Federation, Senegal, Togo, Venezuela, Zambia, Zimbabwe
< 0	Algeria, Congo, Gabon, Nigeria, Syria

Source: Where Is the Wealth of Nations? Measuring Capital for the 21th Century. The World Bank. Washington DC, 2006.

3. Paradoxes of the intangible capital

Scientific validity and objectivity of the given procedure of national wealth estimation causes a lot of doubts among many scientists. First of all, the nature of negative level values of intangible capital in some countries (Algeria, Congo, Gabon, Nigeria, Syria) is not clear. It is obvious, that the value of human capital as a set of knowledge, skills, and qualifications in a given population basically cannot be less than zero. Therefore a negative value for 'intangible capital' in calculations by experts at the World Bank can be explained only by the extremely unsatisfactory quality of the institutions supporting economic activity, not allowing

human potential to be realized. Taking into account the methodology behind the calculations, the economic sense of a negative value for intangible capital in some countries means that the level of GNI is too low in these countries. If it were higher, then higher levels of consumption per capita could be sustained and both total wealth and intangible wealth would be higher. GNI is too low in these countries in the sense that they are achieving extremely poor rates of return on their produced, human, and institutional capital. This is "a classic symptom of the resource curse*" (Where Is the Wealth of Nations, 2006)*.

The wealth of the Russian Federation, having a quarter of the natural resources potential of the planet, was appreciated only at USD $38.700 per capita (55th place). The extremely poor value of Russia's 'intangible capital' - yielding USD $5.900 per capita (84th place) - is 11.8 times lower than the mean international value (USD $69.400) is not of clear nature. It is much lower than the appropriate parameter not only relative to other countries in Central and Eastern Europe and the post-Soviet region, but also to some the classically developing states of Africa and Central America (for comparison: the 'intangible capital' per capita of Namibia – USD $29.000, Romania – USD $16.100, Albania – USD $11.700, Georgia – USD $10.600, Nicaragua – USD $9.400, Ghana – USD $8.300, Senegal – USD $7.900, Haiti – USD $6.800, Zimbabwe – USD $6.700). The share of intangible capital in the national wealth structure of the Russian Federation is only 15 %.

Using other techniques for calculating national wealth, which take into account natural and human potentials, Russia outstrips many developed countries. So, according to the calculations by experts at the Institute of Economics of the Russian Academy of Science (S. Valentej, L. Nesterov, G. Ashirova), the national wealth of Russia, on a per capita basis, comes to USD $400.000 while indices for G-7 countries and the EU averages out to USD $370.000 (*Features of the national wealth reproduction at the beginning of the XXI century, 2006*). Thus, even against the background of the most highly developed regions of the world, Russia appears to be one of the richest countries in terms of human capital and the richest in terms of natural capital. Some lagging behind is observed only with respect to Russia's produced capital as compared with that of the more developed countries. However, it cannot explain the huge difference in GDP per capita between Russia and the most highly developed regions of the world.

To make the national wealth structure elements more comparable, the Russian scientists assumed that the presence of identical market economy conditions and global price levels for arriving at estimations of the appropriate parameters is possible. Therefore the calculated values for the examined parameters, in the case of Russia, reflect scales of available potential regarding

elements of national wealth and its opportunity, instead of real values of estimations for the internal prices counted in US dollars.

It is necessary to note that despite a lack of financing after the reformation period, the Russian Federation still concerns itself with having a superior educational level for its population. One set of parameters experts employ designates Russia as belonging to the group of leading countries in the sphere of education; where now such countries are: Australia, United Kingdom, Germany, India, Spain, Canada, Republic Korea, China, Netherlands, Poland, USA, Finland, France, Sweden and Japan *(Karpenko, Bershadskaya, Voznessenskaya, 2008)*. In Russia, the share of the adult population in the age range of 25-64 years old which had a higher education, based on global standards, is high at 21% (2004). In terms of the number of foreign students hosted, Russia occupies the 7th place in the world; plus, in terms of the number of mega-universities (with more than 180.000 students) in the country - the 8th place in the world.

From the point of view of scientific development, it is also impossible to explain Russia's ultralow value of intangible capital. On the one hand, there is insufficient investment in the market of high technology production. Modern, high technology exports from the Russian Federation do not occupy the most prospective market niches - with highly specialized sales channels and almost no focus toward the consumer market. Its essential role is to serve the intermediate stages of a work process, such as deliveries of nuclear fuel and enrichment of uranium services. Russia's share of the global high technology production market, according to the calculations of the Institute of Statistical Research and Knowledge Economics of the State University - Higher School of Economics (Russian Federation), comes to 0.28%, in terms of the absolute volume of hi-tech exports, Russia occupies the 33rd place in the world (*Long-term prognosis for scientific and technological development of the Russian Federation (2025*), *2008*).

However, in spite of huge financial and other difficulties which Russia faced after disintegration of the USSR, in many key disciplines of basic research (mathematics, nuclear physics, chemistry, physiology, biotechnology, genetic engineering, etc.) it remains a world leader. A large scientific base (about 12% of the scientific world), the high general educational level, and also the mental potential of the nation allow the continuing applied developments of laser and cryogenic engineering, new materials, aerospace engineering, military engineering and technologies, a communication facility and telecommunications, computer science, software etc.

Based on the number of patents received per 1 million persons, Russia has a higher count than the global average (160 and 148 patents respectively). Further. based on the number of patents per USD $1 billion of GDP Russia occupies the 6th place in the world (17.6 patents) after South Korea, Japan, Germany, New Zealand

and the USA (the mean international number is 19 patents). Based on the number of patents in comparison with the amount of funds invested by the countries (state and commercial structures) in scientific and technological research (the number of patents per USD $1 million,) Russia also occupies the 6th place (1.46) after South Korea, Japan, Byelorussia, New Zealand and the Ukraine (an average universal parameter – 0.81) *(The Patent Race, 2007)*.

The quality of Russia's human capital should be recognized as high enough, such that it cannot be explained by the World Bank's 'intangible capital' appraisal of its peers (classically developing states.) The quality of both the formal and informal institutions of the country is considered, as a rule, indirectly: good economic parameters specify that national economic policy and the functioning of the formal and informal institutions both determine effective economic development.

4. Factors of the intangible capital

World Bank research leads one to consider the reasons for the vast difference in incomes between the rich and poor countries; is it explained by a difference in the level of human capital development? What is understood as efficiency with respect to the formal and informal institutions supporting economic activity? If one criterion of this efficiency is the value of national income, on the basis of which 'intangible capital' is calculated, we can thereby see a vicious circle: the rich countries are rich because their institutions are effective and institutions work effectively due to their high levels of national income.

The research procedure used by the World Bank leaves doubt that their 'intangible capital' parameter adequately values the human capital of a given country. However, an empirical check is necessary. To the extent that human capital is understood as "the capital in the form of mental abilities and the practical skills received during education and practical activities of the person" *(Glossary.ru)*, it is possible to assume a high correlation between intangible capital and the parameters describing a given country's level of development in science and education. We analyzed the correlation of intangible capital with the following parameters: the education index of the population; the higher education index (ISCED-level 5A) of the population at the age by which a higher education in the given country would theoretically be completed; the number of patents given to residents; the number of scientists and engineers in the field of research; hi-tech exports, the percentage of manufactured exports.

As a whole, an analysis of the correlation between the value of intangible capital and the number of parameters describing the level of development of education and science (tab. 3), allows one to draw a conclusion; *viz.* that the

highest correlation is observed between the value of intangible capital and the number of scientists and engineers in the field of research per 1 million persons (fig. 1). At the same time, there isn't a high correlation between the value of intangible capital and the level of development of education in a given country. The analysis of the interdependence between the education index value for a given population and the value of intangible capital per capita (fig. 2) indicates that a high education index value for the given population is necessary but an insufficient condition for the growth of intangible capital. In all countries where the value of intangible capital is over USD $100.000 per capita, the education index of the respective population never comes to less than 0.8. However, a high value for the education index by itself does not guarantee a high value for intangible capital (for example, Russian Federation, Moldova). A slightly stronger correlation is observed between the value of intangible capital and the higher education index at the age by which a higher education in the given country would theoretically be completed (fig. 3). Strangely enough, the weakest correlation is between the magnitude of intangible capital and the parameters for productivity in the scientific sphere – the number of patents granted (fig. 4), and the share of hi-tech exports out of the total amount finished goods exports (fig. 5). Further, it is necessary to note that a high level of education and science is simultaneously a prerequisite and a result of high NNI.

Table 3 – The correlation between the value of 'intangible capital' and indicators of science and education, 2000.

Indicators describing the level of science and education	Number of elements in group*	Correlation coefficient	Coefficient of determination, %	T-Student criterion	Critical value of T-Student criterion ($\alpha = 0,05$)
Education index of population	118	0,55	30,71	7,17	1,98
Higher education index (ISCED-level 5A) of the population at the age by which a higher education in the given country would theoretically be completed	60	0,66	43,88	6,73	2,00
Number of patents granted to residents, units per one million	81	0,51	26,41	5,32	1,99

persons					
Number of scientists and engineers in the field of research per one million persons	66	0,82	66,62	11,30	2,00
Hi-tech exports as x% of manufactured exports	90	0,43	18,27	4,43	1,99

* In a number of the countries, the data on the parameters describing the development of science and education are inaccessible.

Sources of data: the World Bank and UNESCO

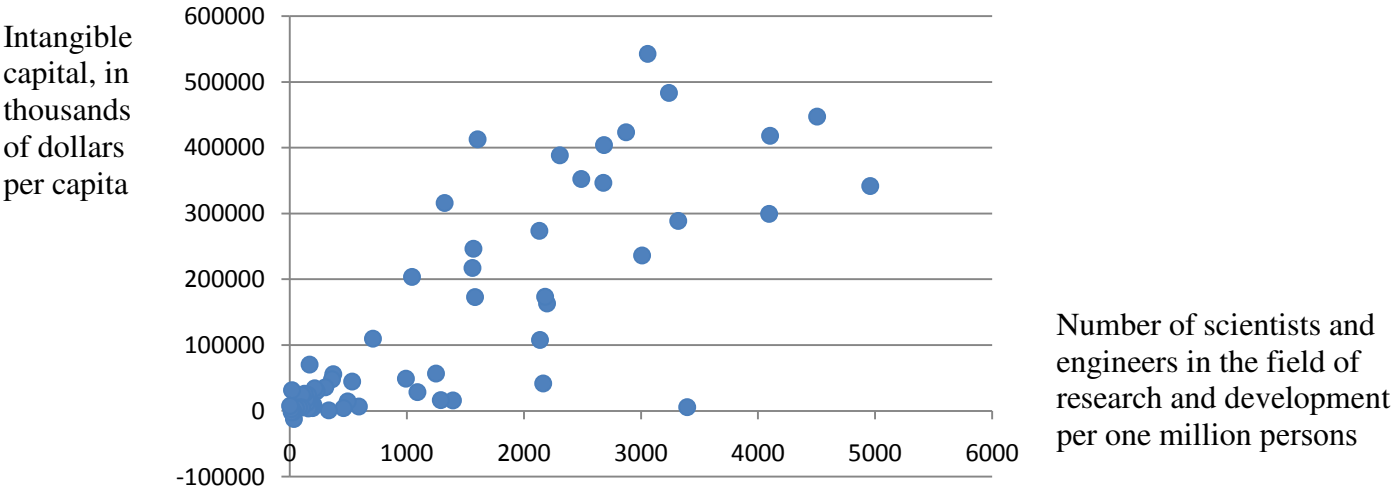


Figure 1 - The correlation between the number of scientists and engineers conducting research and development per one million persons, and the value of intangible capital, 2000.

Source of data: the World Bank

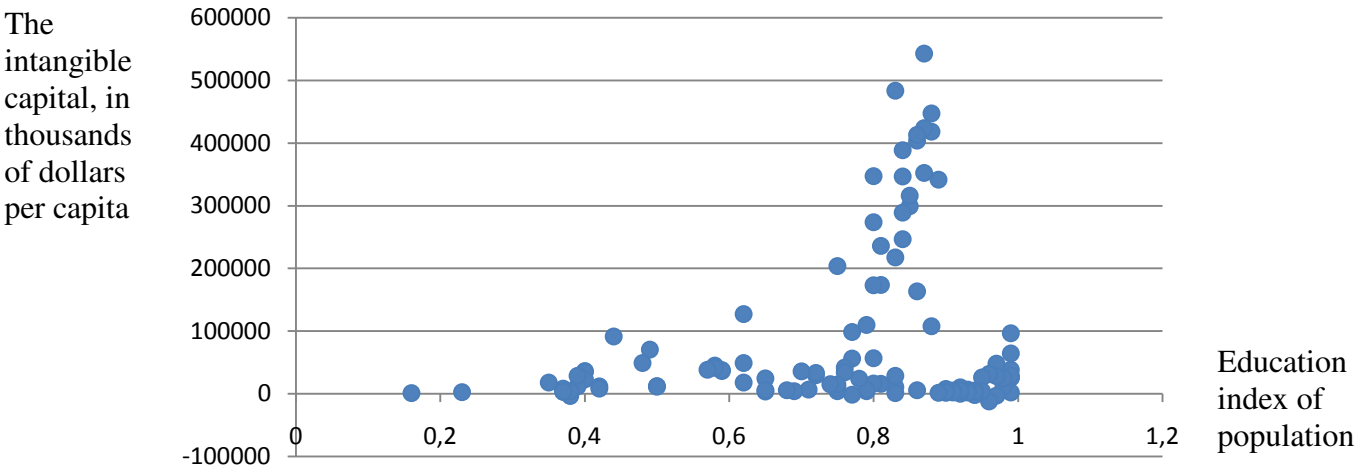


Figure 2 - The correlation between the education index of the population and the value of intangible capital, 2000.

Source of data: the World Bank.

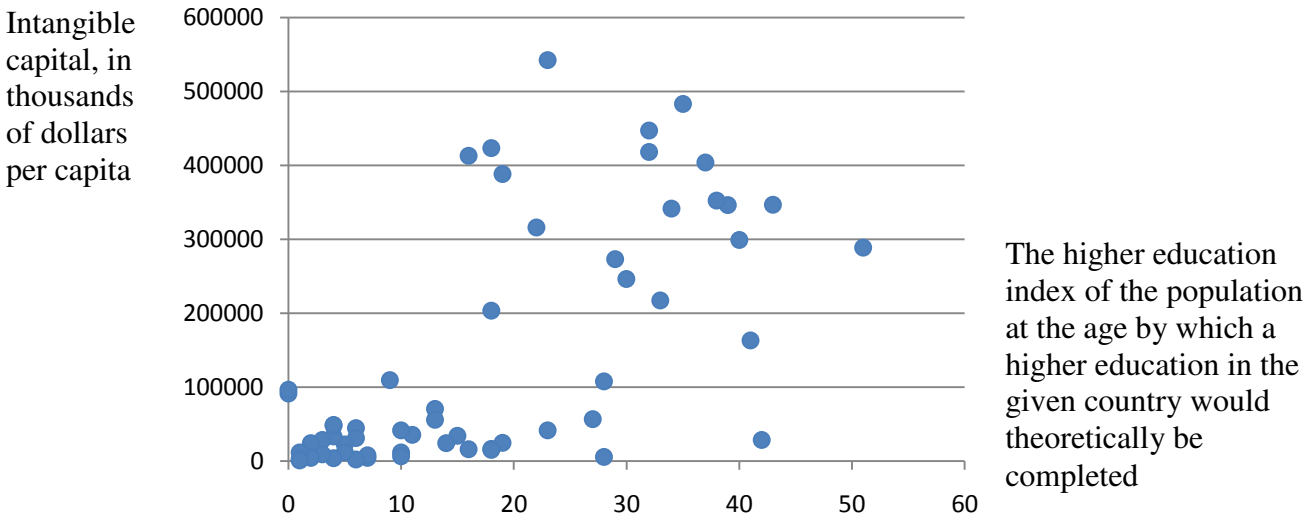


Figure 3 - The correlation between the higher education index of the population at the age by which a higher education in the given country would theoretically be completed and the value of intangible capital, 2000.

Sources of data: the World Bank and UNESCO.

* In the countries for which the data for 2000 were not given, the data of the nearest year after 2000 in which the data were known, were used.

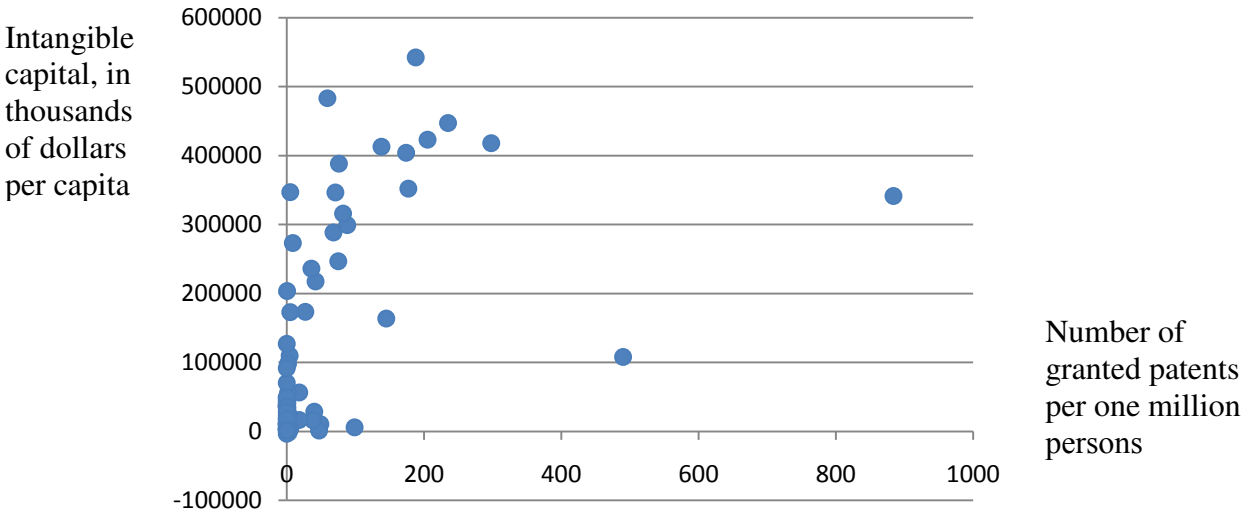


Figure 4 - The correlation between the number of patents granted per one million persons and the value of intangible capital, 2000.
Source of data: the World Bank.

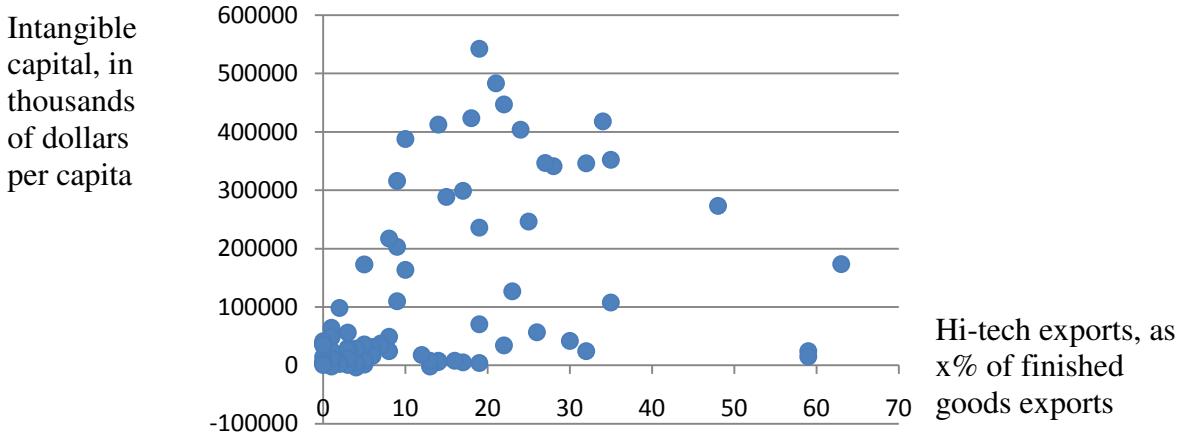


Figure 5 – The correlation between the hi-tech exports, as x% of manufactured exports and the value of intangible capital, 2000.
Source of data: the World Bank.

Rather low values of intangible capital for countries with strong levels of hi-tech exports as a percentage of manufactured exports are found in: Singapore (63%), Malaysia (59%) and the Philippines (59%). This shows that the Southeast Asian countries became assembly departments for the mass production of industrial goods. In the 1980s, sales volumes of the computers manufactured in the South Korea, grew by almost 20 times. However, the final parts made there are

estimated at no more than 15% of the cost of the computers; almost 95% of all models were issued under licenses, and the software remained 100% foreign (*Inozemtsev*, *1999*). As V. Inozemtsev writes, "the source of economic upswing which was so effectively applied by the western powers in the 1990s, has remained practically unknown to these countries *(new industrial countries)*" (*Inozemtsev, 2000)*. New industrial countries didn't solve the major problems, among which can be mentioned, "insensitivity to scientific and technological progress, neglecting to develop a research platform and to transition to intensive economic growth; retention of a very high dependence on the capital markets and technologies; and the inability to develop manufacturing without constantly growing exports of domestic output; 'backwardness' of social structure, and a high propensity to save, which do not allow a modern middle class to take shape, and finally, increasing dependence on the intellectual capacities found outside of developing countries" (*Inozemtsev, 2000)*. From here Inozemtsev has made quite a natural conclusion: "Developing countries are capable of catching up to the advanced world quickly and the progress of less-developed countries does not pose a threat to the monopolar world" (*Inozemtsev, 2000)*.

5. Economic sense of the World Bank's parameter of 'intangible capital'

The paradox of the 'intangible capital' measurement and its low correlation with parameters which index a level of science and education, implicitly hints at a new method of calculation, namely an estimation of 'intangible capital' as a residual. The approach of World Bank experts is based on the classical economic thought referring to the basic production factors of labor, property and capital. All of NNI, except for natural resource rents, is treated as generated by the workforce wherein 'intangible capital' is materialized. However, the contribution of national natural resources to the NNI of developed countries is very small (these countries accounting for 16% of the Earth's population, consume 85% of the world natural resources - concentrated mostly outside of their own borders). The enormous value of the developing countries' NNI cannot be explained by World Bank experts without reference to an enormous amount of 'intangible capital;' i.e. the highest level of science and education development and of economic institutions' quality. Actually, this model does not take into account the factors of production behind developed countries' wealth.

Insofar as added value is the basic source of national income and national wealth growth, domestic and foreign economic policy should be directed toward the achievement of an overall objective - maximization of added value in the country. Growth rates of national wealth are directly proportional to the added value multiplier and the depth of processing products. The added value multiplier

on a unit of raw materials cost is calculated by dividing the value of finished goods into the value of raw materials. This shows the extent of value-added processing. In Russia, the added value multiplier is very low. It comes to 2.9 versus 14-15 in the USA and leading countries of the EU (*Gubanov, S.S., 2009*).

Added value can be created by domestic production or it can be received through the extensive use of foreign production and the exporting of manufactured goods. Obviously, the distinguishing of four models of national wealth growth (fig. 6) becomes possible. The first model, "the added value accumulator due to internal factors," represents the model of development based mainly on domestic forces. A classical example is the USSR. The economic system of the Soviet Union, based mainly on domestic resources, allowed the USSR to achieve almost full self-sufficiency. Foreign trade played an auxiliary role: imports solved the problem of maintaining internal manufacturing through certain missing resources, machines and equipment; also, purchases of some consumer goods and exports enabled receptions of foreign currency for these purposes.

As opposed to this model, the "world factory" is based on the multiplication of added value using a foreign source of raw materials (fig. 7). This multiplication is known from the days of mercantilism, - an exchange of finished goods for raw materials (colonial type trade). In addressing the resource constraints of the national economy by using raw materials from less developed countries, the process of added value multiplication is carried out in the economically-advanced countries (fig. 7a). But this process does not come to an end: the parts of finished goods made with imported raw materials will then be exchanged for raw materials which again will be heavily processed, etc. (fig. 7б).

It is necessary to emphasize, that the "world factory" model cannot exist independently. Its functioning requires the presence of "raw material inputs." Therefore the "world factory" demands constant re-investment of a portion of the added value in the development of competitive advantages - in order to maintain their advantage over developing countries. The added value created by using imported raw material is "embodied" within multiple components of national wealth in the advanced countries; it is invested in various industries - the credit and financial spheres, and in the development of science, education, medicine, environmental protection; it finances various forms of external economic expansion etc. All of this creates a gap in socio-economic, scientific and technical areas between the developed and developing countries which is practically insurmountable. The "world factory" model is therefore the best variant from the point of view of wealth accumulation.

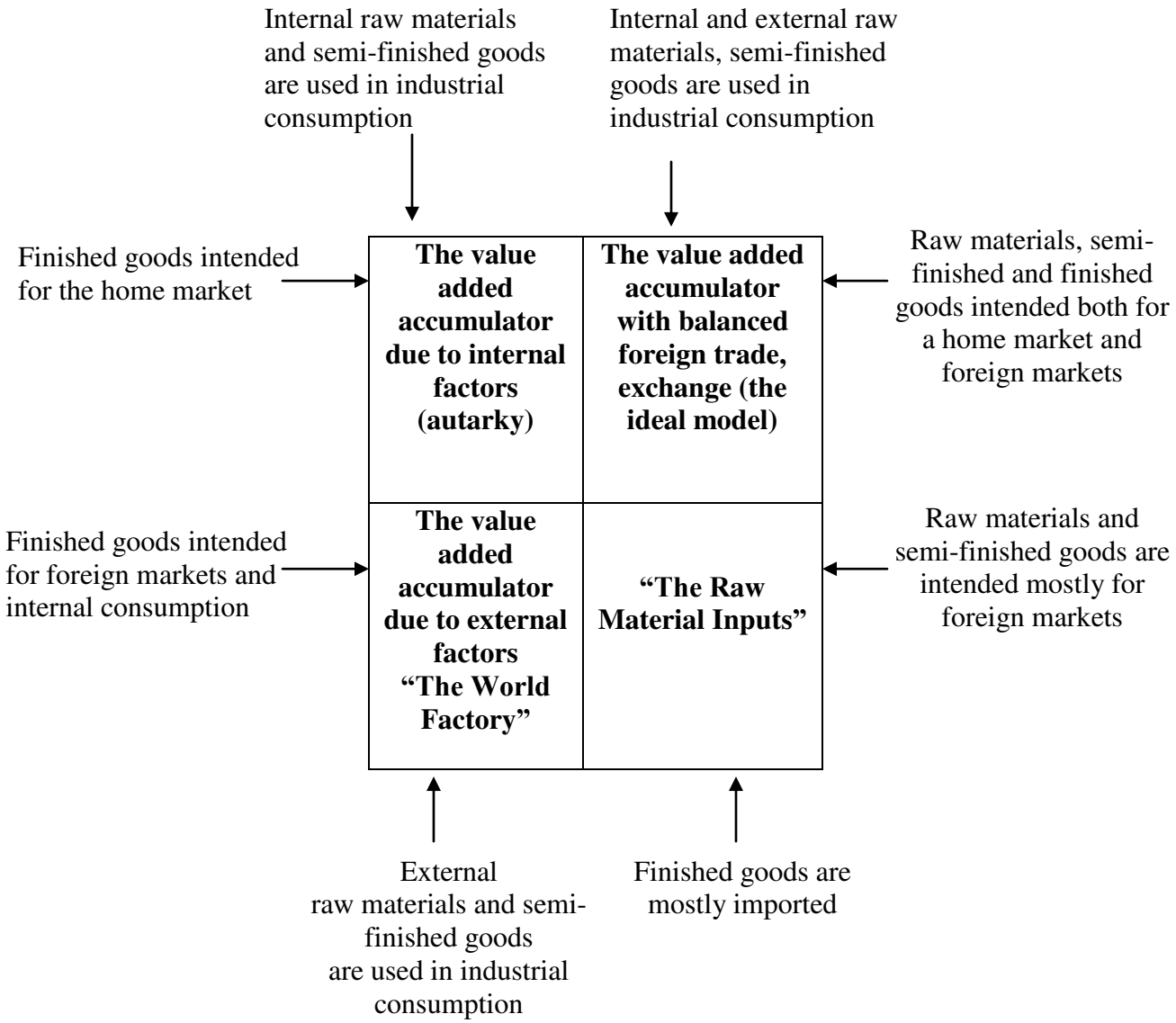


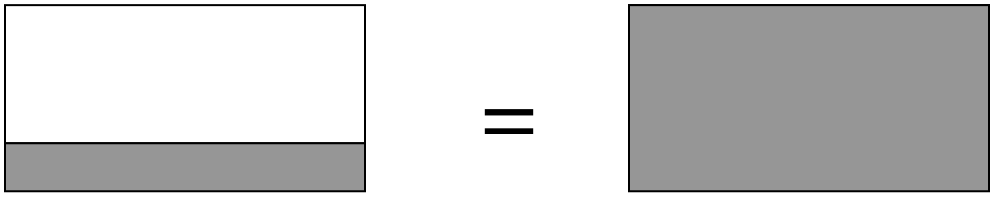
Figure 6 - National wealth growth models.

The "raw material inputs" model is extremely bad for the accumulation of wealth. Because of production specialization toward a low degree of processing in the given model, added value accumulations are extremely small for development into a new qualitative level of the industrial base, leading to a break in scientific or human capital development.

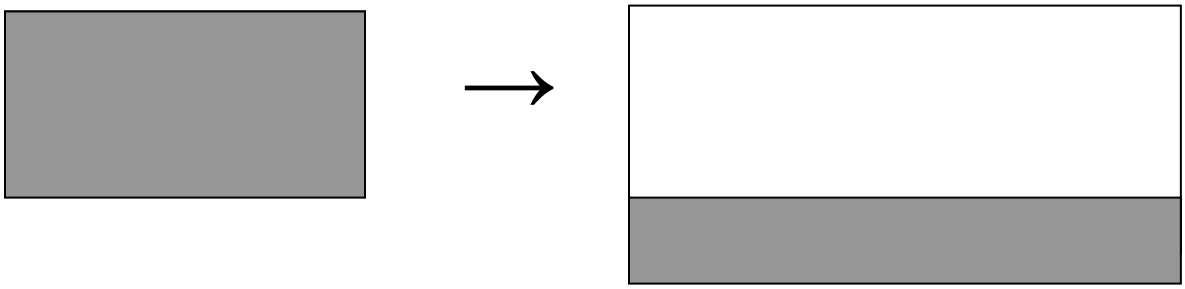
Finally, the "value added accumulator with balanced foreign trade exchange" represents an ideal model. It is devoid of the widely known shortcomings of autarchy; however, it also does not utilize the colonial-type trade system. The extent of processing imported products is approximately equal to the extent of processing exported products (as trade between the advanced countries).

The precondition for the occurrence of this model is an equality among the countries on economic, scientific and technical levels. Unfortunately, in the modern world the majority of the countries with market economies tend to lean toward the “world factory” model, or toward the “raw material inputs” model.

It is logical that the national income of the “world factory” model will exceed the national income of the “added value accumulator due to internal factors” model, which will in turn be higher than that of those employing the “raw material inputs” model. For this reason, S. Amin and other authors of dependent development theories, understanding that independent capitalism is impossible for the Periphery, saw a way out in socialism - understood as maintenance of economic autonomy.



а) Exchange of finished goods for raw materials and semi-finished goods.



б) Processing of raw materials and semi-finished goods.

Figure 7 – Added value multiplication as a result of an exchange of finished goods for raw material.

- The added cost created on the basis of imported raw materials

- Raw materials and semi-finished goods

The first country using the "value added accumulator" model was Great Britain, which up to the middle 19th century achieved a global industrial monopoly. In the late 19th century, German goods began to compete with British goods. In the 20th century the «world factories» steel of the country of a triad: USA - Western Europe - Japan, using the known scheme of finished goods exchange for raw materials. Foreign trade for many advanced countries became the most powerful stimulator of economic growth and the key factor for the accumulation of national wealth. A vivid example highlights Germany, which in the post-war period in many respects needed to grow its economic well-being through foreign trade. Nowadays, about 20% of all employees in the German economy directly or indirectly work on export; each fourth euro is earned in the foreign trade of goods and services (*Tatsachen über Deutschland, 2008)*.

The precondition of the Western countries' transformation into "world factories" was a conquest of remote colonies which played the roles of commodity markets for industrial output; as sources of raw materials for the growing industry of metropolis. As a result, one-sided raw-material specialization in the colonized countries of the global economy became fixed. Having gotten away from political dependence, former colonies continued to serve as raw material sources to industrialized nations. It is interesting, that the majority of the countries of the EU-15 (United Kingdom, Spain, Portugal, Denmark, Netherlands, Germany, Belgium, Italy, France, Sweden), and also the USA and Japan had colonies in the past.

Now the "world factory" model has gradually become the "world manager" model, meaning globally branched out manufacturing facilities kept under remote management. The manufacturing function has been transferred to the new "world factories" (new industrial countries of Southeast Asia, China) due to the principle of industrial cost minimization, and the "world manager" carries out the functions of investment, production management and supply to end-customers.

By specializing as a source of raw materials, a country is at a disadvantage not only in terms of added value under-production; specializing in commodity goods also leads to less favorable terms of trade. First, these specialized markets for material resources, except for those with the rarest resources, as a rule, are buyer markets and thus specialization in raw materials alone is in itself a precondition for market power concentration on the buyer's side - with a reduction in a selling market's surplus. Second, the multiplication of value added leads to an ever-growing gap in the wage rates between advanced and less developed countries. In spite of the downfall of the colonial system, the gap in wage rates increased during the second half of the 20th century; during the last decade of the 20th century, this gap grew 100-fold (*Shishkov, Y.V., 2003)*.

As American economist, J.W. Smith has established, free trade between rich and poor countries leads to a square-law difference in capital accumulation because

of unequal wage rates *(Smith J.W., 2005).* The difference in the accumulation of material wealth in the higher wage rate nation in comparison with the lower wage rate nation can be expressed by the formula:

$$A = \left(\frac{W_r}{W_p} \right)^2, \quad (1)$$

A - advantage in the capital accumulation;
Wr - wages per hour in the rich country;
Wp - wages per hour in the poor country.

In the low and middle income countries, the significant deviation of the US dollar exchange rates to their national currencies from PPP is observed. An exchange rate deviation from PPP in the range of 2-3 times higher is typical for low income countries. For middle income countries, the US dollar exchange rates to their national currencies are also overestimated, but to a lesser degree, on the average, by 1,5 to 2 times higher. In the group of high income countries, US dollar exchange rates have a limit of fluctuations around PPP, on the average 10 to 13%. If the exchange rate of the respective national currency to the US dollar is underestimated by a factor of *n*, having purchased US dollars in the international market to buy imported goods, the country pays almost *n* times more of their goods for the imported goods, than would follow from PPP. A trading partner whose exchange rate is approximately equal with PPP thus receives a "monetary transfer" (*Lipke, 2010*).

The correlation between exchange rate deviations from PPP and the general level of economic development is explained, on the one hand, by the dynamics of foreign trade prices; and on the other, by the relationship between supply and demand for the national currency. Developed and developing countries have unequal opportunities for maneuvering within the structure of exports and imports. Opportunities for less developed countries are sharply limited by their range of exports and adaptation to global market conditions. The range of exports from these countries consists of a narrow group of raw materials and food items. They are compelled, in the presence of lower prices, to expand the variety of their exports to more traditional export products. A reduction in global prices for many of these goods decreases the export incomes these countries receive and limits their receipt of foreign currency - which therefore sharply reduces their opportunities for economic development and improved variation in their range of imports. Weak demand for developing countries' currencies and the high demand for developed countries' currencies are the reasons for long-term falling exchange rates of

developing countries' currencies and their underestimation (*Somel, 2003*).

However, the increase in the volumes of the international financial markets has resulted in the exchange rate of currencies ceasing to be determined mainly in foreign trade. With respect to commodity transactions, maintenance now comes to no more than 2% of the currency exchange operations committed in the world. Therefore the probability of an exchange rate deviating from the PPP has greatly increased. Instant currency depreciation of 2 or 4 times as it was with the Russian ruble in 1998, no longer surprises anybody. Only in the case of some countries (for example, China) it is possible to prevent a manipulation of domestic currency.

The multiple exchange rate deviation from PPP in developing countries results in paying for a huge amount of resources and products imported from developing countries at a rate of less than 5% of the money's equivalent in developed countries working hours (*Makhijani A., 2000)*. It is no wonder therefore, that the third world countries consume a relatively small amount of the Western countries' goods and frequently experience a negative balance of payments.

Using a reserve currency in international trade leads to the development of an inter-temporal trade, i.e. term-less and interest-free commodity lending from the less developed countries to the advanced countries. The significant part of this credit will probably not be returned as volumes of the reserve currency in the world repeatedly exceed the stocks of real commodities - material assets. Due to a positive balance of foreign trade, sharply needed capital outflow in the home country is quite often carried out.

All of what has been set forth above results in the underestimated personal and industrial consumption of developing countries - not allowing them to make breakthroughs in economic, scientific and technical developments.

6. Check of a hypothesis about the factor of an external world

As shown heretofore, the results of the World Bank's research reflect, first of all, that only an insignificant part of the advanced world's NNI is created due to national natural resources. On the other hand, it is necessary to agree with the conclusions of scientists that the natural-resource potential of the developing countries is used inefficiently. The reason for this inefficiency is chiefly caused by their choice to specialize as raw materials markets.

Let us calculate the correlation coefficients between the value of 'intangible capital' and the indicators of a country's inclusion in unequal exchange relations. The indicators we use are: primary exports, percentage of merchandise exports and exchange rate distortion (foreign exchange rate divided by PPP).

Correlations between the values of 'intangible capital' and primary exports, percentage of merchandise exports (tab. 4), and exchange rate distortion as a

whole are higher than with the majority of indicators describing the level of science and education(except number of scientists and engineers in the field of research.) Hence, raw materials specialization is the more important factor for predicting the probability of low incomes.

Table 4 – The correlation between the value of 'intangible capital' and the indicators describing the inclusion of countries in unequal exchange relations.

The indicators describing inclusion of countries in relations of unequal exchange	Number of elements in a group*	Correlation coefficient	Coefficient of determination, %	T-Student criterion	Critical value of T-Student criterion (α =0,05)
Raw exports, % of merchandise exports	89	- 0,73	54	10,10	1,99
Exchange rate distortion	112	- 0,71	50,5	10,59	1,98

Source of data: the World Bank.

Apparently from the correlation field (fig. 8 - below), the correlation between raw exports, the percentage of merchandise exports and the value of 'intangible capital' is almost functional. It is described by a broken curve. We shall calculate the correlation coefficients between the value of 'intangible capital' and raw exports, the percentage of merchandise exports separately for the countries with shares of raw exports greater than 23% and less than 23%[1] of merchandise exports respectively (tab. 5).

Table 5 - The correlation between the value of 'intangible capital' and raw exports, the percentage of merchandise exports (separately for countries with shares of raw exports in merchandise exports of more and less than 23%).

Raw exports, % of merchandise exports	Number of elements in a group*	Correlation coefficient	Coefficient of determination, %	T-Student criterion	Critical value of T-Student criterion (α =0,05)
Raw exports, % of merchandise exports (for	31	-0,99	98	37,60	2,04

[1] In this case the calculated correlation coefficients are more than 22% or 24%.

countries with shares of raw exports in merchandise exports of less than or equal to 23%).					
Raw exports, % of merchandise exports (for countries with shares of raw exports in merchandise exports of greater than 23%)	58	-0,98	97	42,57	2,00

Source of data: the World Bank.

The correlation between raw exports, the percentage of merchandise exports and the value of 'intangible capital' represents a broken curve: with shares of raw exports in total merchandise exports of less than 23%, the functional dependence looks like y = - 25736.1 x + 630759.9; and with shares of raw exports in total merchandise exports greater than 23% : y = - 556.2 x + 58257.0 - where x - raw exports, the percentage of merchandise exports and y - value of the intangible capital, in thousands of US dollars per capita.

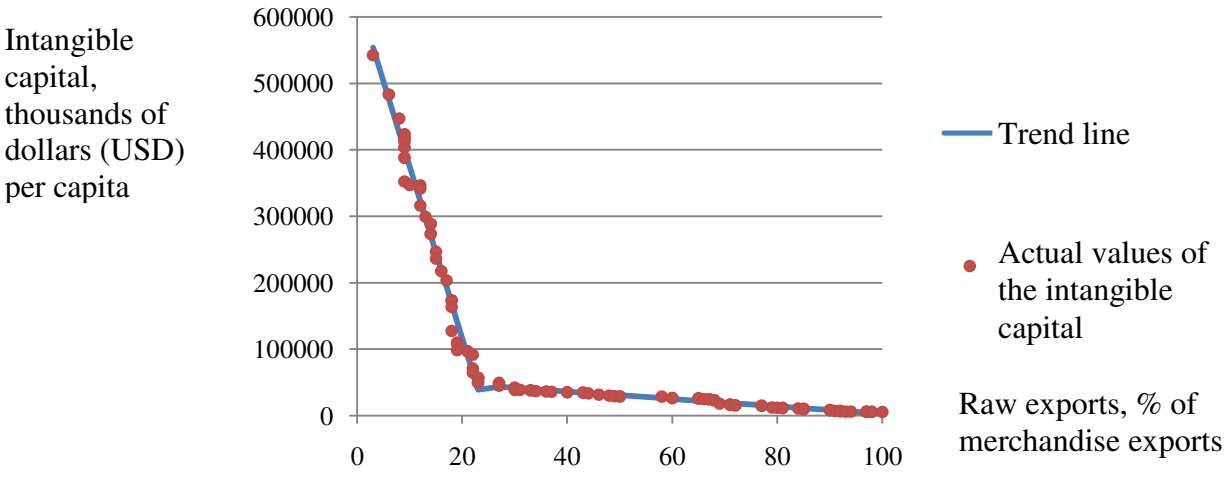


Figure 8 - The correlation between raw exports, the percentage of merchandise exports and the value of 'intangible capital,' 2000.

Source of data: the World Bank.

It is remarkable that the graphical shape of the interdependence between the exchange rate distortion and the value of 'intangible capital' (fig. 9) practically completely repeats the form of interdependence between raw exports, the percentage of merchandise exports and the value of 'intangible capital' (fig. 8).

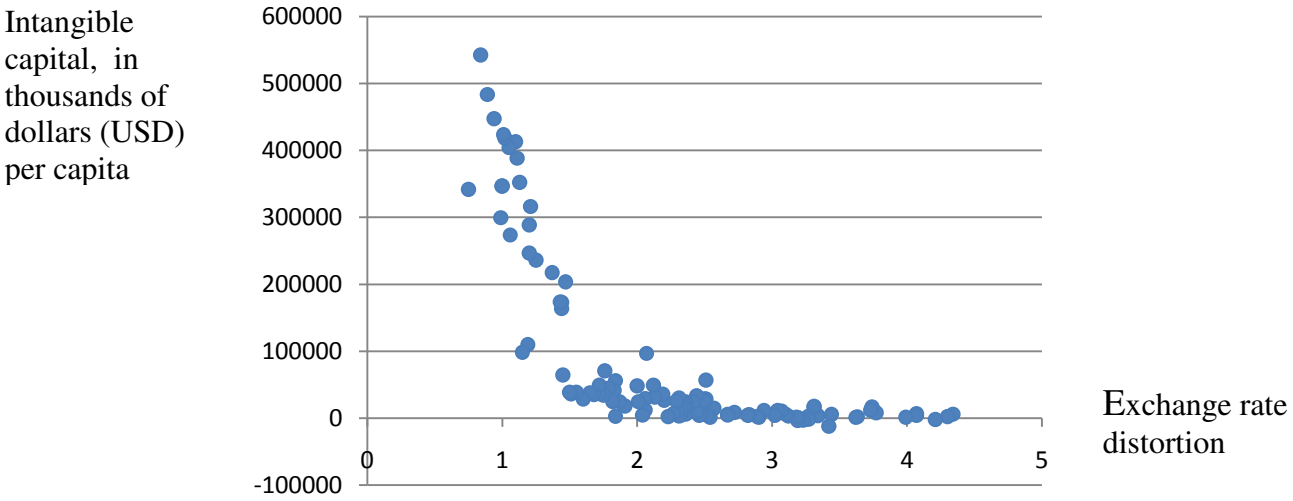


Figure 9 – The correlation between the exchange rate distortion and the value of 'intangible capital,' 2000.
Source of data: the World Bank.

7. Conclusions

The high level of 'intangible capital' held by developed countries is caused by added value multiplication - through the exchange of finished goods for raw materials, and the exchange of proportions following from export specialization that favors the developed countries. The low value of 'intangible capital' specifies the raw specialization in the international division of labor.

The interdependence between the value of 'intangible capital' and the share of raw exports in merchandise exports, separately considered for countries with shares of raw exports in merchandise exports greater and less than 23% respectively, is close to functional and is described by a broken curve. The change of a curve inclination corner allows for the hypothesis that while reducing the raw material share in total exports to lower than 23%, the country turns from being the donor to being the recipient of global wealth. Value "23" is probably connected to a share of raw material costs in the value of finished goods production (world GDP) under current technological order.

The value of 'intangible capital' reflects opportunities for the country to multiply the added value, i.e., to process raw materials into finished goods. It is

therefore logical that for the growth of 'intangible capital' and consequently, national wealth, it is necessary to depart from the vicious cycle of exchanging raw materials for finished goods. This problem is very complex, and after decades of work, many countries have not solved it. It is necessary to emphasize that trade under the colonial-type system is a process developed in dynamics and self-reproduction. In this process, the gains of the stronger partner are always replicated to widen the gap relative to the weaker partner.

On the one hand, the developed countries undertake significant and regular efforts to fasten and perpetuate the established unequal relations. Sources of competitive advantages in different historical epochs were military power, monopoly power over the means of goods transportation, advanced technologies of manufacture, and in the modern century of the information economy – also over the mass-media used for advertising goods, and with respect to reserve currency. As fairly marks F. Brodel, the international division of labor, apart from comparative advantages, is also determined by the influence of advanced countries on the rest of the world to specialize (*Braudel F., 1992)*. On the other hand, the products of the raw materials economics model are often criminalization and corruption. The raw materials model for a national economy is extremely disadvantageous for the adopting country as a whole, but it can be very favorable to the national elites, who profit from the sale of domestic natural resources abroad and trade for foreign goods and keep their capital in foreign banks. This is the rationale of the "raw curse". That is why it's so difficult to move away from commodity specialization. Such drastic administrative measures would be necessary. However, it doesn't mean fully ignoring economic market regulators.

The concrete strategy will certainly differ for those countries which are not yet past the stage of industrialization; or those which have survived partial deindustrialization during the transition from a command to a market model (e.g. a number of post-Soviet countries). However, in both cases, the nationalization of mining companies is necessary to stop waste and the outflow of national wealth and to concentrate on resources for development and growth by the state. Furthermore, the high profitability of the intermediate conversion makes it difficult to maintain competitively high value added products. The alternative is the creation of vertically-integrated industrial complexes.

To begin, it is necessary to concentrate efforts on winning the domestic market share away from foreign finished goods manufacturers, having optimized tax, monetary and credit policy. The high interest rates of the banks do not currently encourage the development of a manufacturing sector, especially those with a long production cycle. It is necessary to divert banking capital from speculative activity and financing of trading-intermediary operations to the financing of manufacturing, which may require the nationalization of banks.

Taking into account the substantial social stratification - with respect to income levels and property within many raw material-exporting countries - the redistribution of incomes from rich to poor will allow the problem of sufficient demand for the development of a domestic industry to be solved. An effective measure for industrial development, in particular for countries with narrow markets, would be to create a common market with neighboring countries.

Foreign trade tariff escalation and a gradual withdrawal from the use of a foreign reserve currency may be necessary. Many countries have realized losses in their national economies arising from inter-temporal trade. One approach could be the formation of a regional reserve currency - based on a basket of integrating countries' currencies and used to service their trade among themselves. Certainly, quotas on the issue of the given currency should be distributed between all country-participants of the particular integration.

To prevent the perpetuation of inefficient economic models, there needs to be increased accountability on the part of the political elite to the people, solving the most important socio-economic issues in a general referendum.

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