

Design of Sustainable Development: Intellectual Value of Large BRIC Companies and Factors of their Growth

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Abstract: Intellectual capital and its components can be regarded as the source for a company's organic growth to maintain sustainable development. Under the crisis conditions most of financial reserves are unavailable; the inner organizational efficiency by means of intellectual capital is a question of survival edge for most of the large companies of emerging markets. Multidirectional trends of the development of BRIC economies played a significant role in this discussion and the issue became more complicated under the pressure of the crisis. Notwithstanding BRIC countries can be regarded as leaders of so-called developing economies. In terms of the downturn, however, the problem of the crisis should not be overstated: due to the cyclical changes of the world economy the stagnation will be rearranged by upturn sooner or later, however the accumulation of intellectual capital is the over time process. Intellectual capital of the company and its components can be regarded as "latent reserves" of the long term value growth. Intellectual capital is the "intangible safety-cushion" and it can be used only by those companies who have created it years before and therefore have focused on sustainable development. The research of intellectual capital components and its role in value creation and building competitive advantage can remain an actual topic for empirical investigations, carried out in various countries and by different research centers. The intellectual value of a company is a part of the total value, created through the process of the intellectual components' accumulation. The main goal of this research is to evaluate by means of the panel data analysis the influence of particular components of intellectual capital on the intellectual value of BRIC companies. The process of intellectual capital accumulation is over time and it can be measured according to the long run panel data analysis not less than 5 years. The panel data analysis revealed that the human capital can be considered the key factor of the long-term growth of BRIC companies of all industries. Employees and their competencies are this basis which is undervalued currently whereas most of financial assets lost trust and its value. However, specified directions of internal reserves audit and discussion of the Intellectual value on the emerging markets are very close to the fact that large BRIC companies depend a lot on the specific features of the infrastructure of each developing country. India and Russia are countries with the industrial potential, which is not fully realized, e.g. a lot of Russian companies are underinvested with unbalanced development strategies. Decrepit and out-of-date production facilities, in turn capital expenditures are a matter of great importance. The capital expenditures together with innovative managers and management techniques tend to be the leverage, which can push these companies towards intensive development, especially Russian companies.

Keywords: intellectual capital, human capital, stakeholders, growth drivers, sustainable competitive advantage, value, intellectual value, financial crisis, BRIC, developing countries, emerging markets

1. Introduction

Intellectual capital and its *components* can be regarded as the source for the company's *organic growth*. Under the crisis conditions most of financial reserves are unavailable; the inner *organizational efficiency* by the means of *intellectual capital* is the question of the survival edge for most of large BRIC companies. The analysis and the closer valuation of internal sources is now of a great importance especially for companies from *developing countries*, due to the fact that under the *financial crisis* conditions these immature capital markets with weak infrastructure can be revealed in terms of the future potential and can break the trend of the *world economy* global downturn.

It is crucial to underline that the problem of highlighting and unification of outstanding capital markets of developing countries is on the edge of discussions among economists worldwide. It is important to emphasize that in most cases there is no common view on whether it is still reasonable to group BRIC countries (Brazil, Russia, India and China). The term "BRIC" was launched in the year of 2003 by an economist from Goldman Sachs investment bank Jim O'Neill in one of his analytical reports. He has assumed that this group of countries had common characteristics:

- national financial assets are underestimated and have a great potential of growth;
- all countries can be recognized as developing ones;
- up to 2020 years the aggregated GDP of BRIC countries would exceed the GDP volume of the so-called G-7 ("Great Seven") countries.

Multidirectional trends of the development of BRIC economies played the significant role in this discussion and the issue became more complicated under the pressure of the crisis. It is necessary to mention that BRIC countries are considered to be the largest developing markets; simultaneously they are characterized by a diverse level of potential. Before the crisis experts have selected a group of "leaders", China and Brazil, and a group of "pushovers", India and Russia. However now at the first stage of the global downturn it can be assumed that the BRIC group can be divided accordingly: "source economies" Brazil - Russia, "innovative economies" India – China. India is characterized by a high level of the consumer demand and high forecasted levels of GDP growth, and in addition by the aggressive external expansion and the maintenance of the fixed exchange rate of national currency, which ensures high competitiveness of national export goods.

The crisis has revealed that four BRIC countries have a range of distinctions, particularly in possibilities and methods of national economics' stimulation under downturn conditions. Notwithstanding these countries can be regarded as leaders of the so-called *developing economies*. In terms of the downturn, however, the problem of the crisis should not be overstated: due to the cyclical changes of the world economy the stagnation will be rearranged by the upturn sooner or later, however accumulation of the *intellectual capital* is the over time process. Especially due to this reason the latent reserves of the companies of *developing capital markets* in the long-run still plays an important role.

Intellectual capital of the company as a whole and its components can be regarded as "*latent reserves*" of the long term value growth. *Intellectual capital* is the "intangible safety-cushion" and it can be used only by those companies who have created it years before and therefore have directed the cash flows to maintain *sustainable development*.

Generally the additional reports published by the company or some other public information may provide details about intangibles of the company (these reports can for example contain rules of various groups of intangible assets accounting principles, their amortization period, etc.) Nevertheless, the so-called *intellectual capital* reports to some extent can reduce investors' risk, due to the fact that such reports disclose more relevant information in comparison towards standard companies' reports.

The research of *intellectual capital* components and its role in the *value* creation and building the *competitive advantage* can remain an actual topic for the empirical investigations, carried out in various countries and research centers. Bismuth and Tojo (2008) have come to the conclusion that companies should stimulate investment in *innovations*, should increase *innovation capital*, and supervising authorities, government should protect intellectual property rights and should also stimulate the mobility of the workforce and the knowledge exchange.

From the point of view of Bayburina, Golovko (2008) the *intellectual capital* is a complexity of key qualitative characteristics of the company, which are not always objects of intellectual property, such as, for instance, competencies. Thus, *intellectual capital* is a complexity of knowledge, accrued experience of employees and intellectual property. It is important to mention that not all objects of engineering design are the objects of the intellectual property; however its importance for the process of the value creation is difficult to underestimate, for example, in the companies of the high tech industry. Simultaneously it is complicated to provide the full, complete, exact definition of the notion '*intellectual capital of the company*'. For this purpose it is reasonable to concentrate on its structure and the content. In less details it is possible to form a structure of *intellectual capital*, which consists of the 5 following components or the elements of the first level of *intellectual capital*; this approach has been used by the authors Bayburina, Ivashkovskaya (2007); Bayburina, Golovko (2008); Bayburina, Golovko (2009). Briefly, the structure of *intellectual capital* could be described as follows:

- a) human capital (key knowledge and abilities of the personnel);
- b) process capital (key characteristics of the business processes of the company);
- c) client capital (key features of the company which are necessary to manage customer relationship and loyalty);
- d) innovation capital (renovation techniques to maintain the future growth of the company);
- e) network capital (synergy which occurs from the interactions of the company).

The complexity of such characteristics represents the competitive advantage originated inside and within the company. According to Bayburina and Golovko (2008) from the one hand the volatility of the business environment from the other hand the opposite stakeholders interests stipulate the fact that value becomes the result of constant strategic changes. In this case the value becomes a complicated intellectual parameter, which is managed and defined by the multi-level combination of interactions of different groups of stakeholders. By this pattern the value is generated by its intellectual part. So, Bayburina, Golovko (2008) conclude, that the *Intellectual value* of the company is a part of the total value, created through the process of the intellectual components' accumulation. And moreover this value can be "traced" by the external stakeholders of the company. In addition, we can underline that the delta (the difference) between the Market value of the equity and its Book value can also be "traced".

According to Bayburina (2007); Bayburina and Ivashkovskaya (2007) it is necessary to determine the reason for taking into account only the characteristics of the Equity. Managers of BRIC companies when targeting the capital structure of the company do not always consider future growth and sustainable development as the long- and medium term goal especially with emerging markets sample of companies. That is why the choice of the capital structure by BRIC companies depends on a range of factors, which cannot be considered in this article and are left for the future distinguished research from the conceptual point of view.

The main goal of this research is to evaluate the influence of particular components of *intellectual capital* on the *Intellectual value* of BRIC companies.

2. Intellectual value research

2.1 Background approach

The research described in this article focuses on the assessment of *intellectual capital components and subcomponents'* contribution to the process of the company value creation over the long-term period. The notion *intellectual capital* in general is more broad and complex than *Intangible Assets* (*intellectual capital* includes *intangible assets* and other qualitative, non-financial key characteristics reflecting the current status of the company, by taking into consideration its potential for the future growth).

It is possible to define two aggregate approaches to the measurement of the company's activity with the purpose of evaluating its potential for future long-term growth (and thereafter). So, according to this logic, the authors of this article can determine two approaches to measurement of the company's value added:

- the analysis of the company is based on the accounting reports and,
- the analysis based on VBM principles.

The *Intellectual Value Based Management* approach is regarded as the modification of the basic Value Based Management approach in terms of the current dynamic economic changes (see Figure 1, 2).

Consequently the analysis of the *Intellectual value* of the company should be systematic (i.e. should be observed across a number of consecutive time periods) and should include either the assessment of fundamental characteristics of the company, or the assessment of its *intellectual capital* components. According to Bayburina (2007) the analysis of the company's accrued *intellectual capital* should serve as the measure of the company's attendant risk, the risk of the deviation of the actual performance results from the predicted ones, including financial performance of the company. The classification of the factors, which influence the Value of the company created by Edvinsson and Malone (1997), the founders of the *intellectual capital theory*, is presented in figure 3.

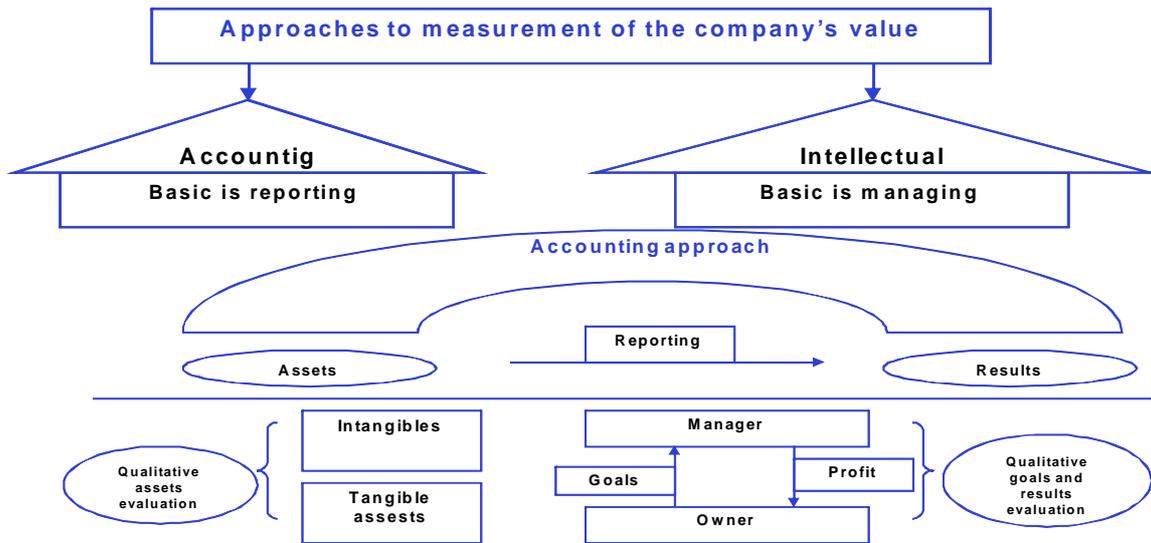


Figure 1: Accounting approach towards the performance evaluation

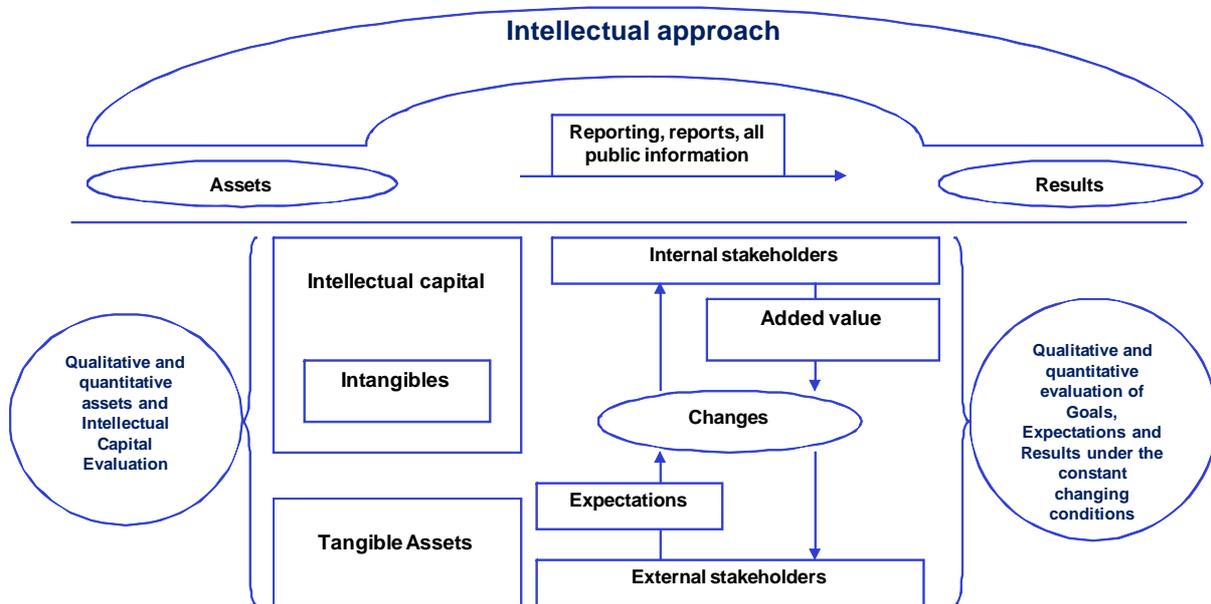


Figure 2: Intellectual approach towards the performance evaluation

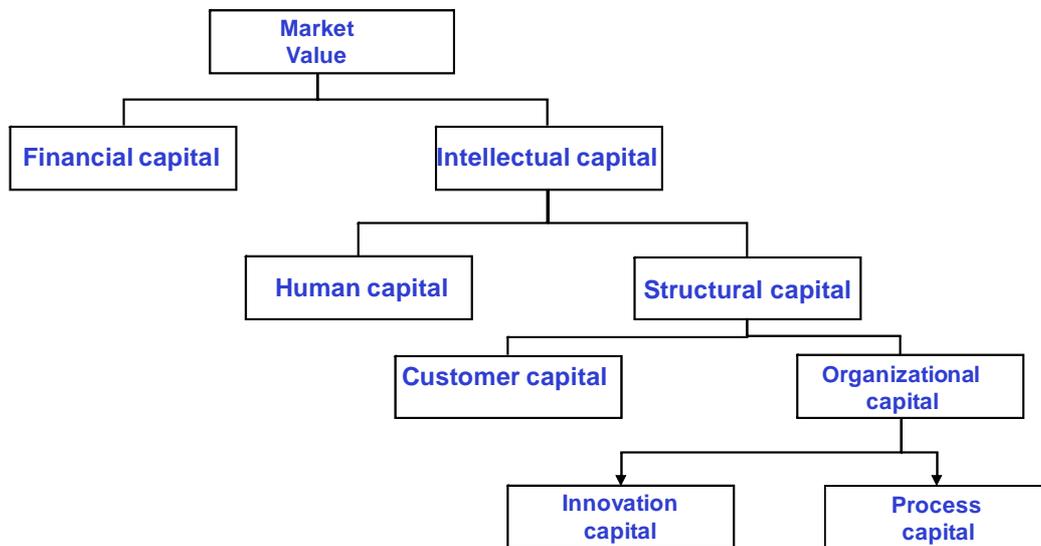


Figure 3: Edvinsson and Malone (1997) classification

Since there is a lack of academic research which consider the analysis of *intellectual capital* components in the large companies of emerging markets and which are aimed at revealing the factors of the long-term growth of its value, the results of this research might add to the existing *Knowledge Management Concepts*, and offer a new instrument for this kind of analysis.

The results of the empirical research may be used either by internal stakeholders (managers), or by external stakeholders (investors). The former can use it in addition to the basic Value Management principles; however investors can use it in the process of investment portfolio diversification (in terms of buying shares).

The research model is based on the methodologies used by the large consulting companies focused on the Intellectual capital valuation (Skandia Navigator, Celemi Monitor) and methods of measuring intangible assets used by Karl-Eric Sveiby.

The examples of *intellectual capital components* used within the above mentioned methods for evaluating various companies are shown in the Figure 4 below.

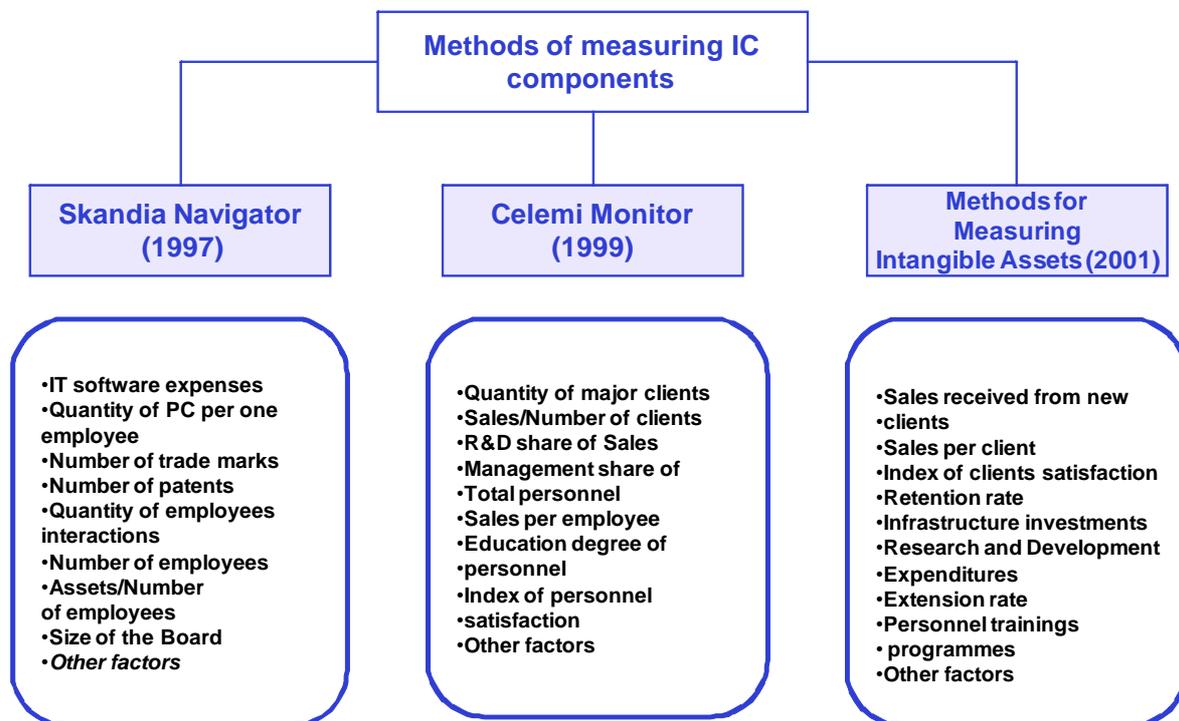


Figure 4: Methods of measuring intellectual capital components: some examples of proxy variables

The main aim of the research is to determine the impact of the following factors (independent variables, IC components and sub-components) on the dependent variables (the indicator of the intellectual value):

- Fundamental factors (a group of explanatory variables representing the fundamental factors of the Value's growth of the company);
- Intellectual capital components (a group of factors representing the components of the intellectual capital).

According to the Intellectual capital components' classification, this approach has been used and developed by the authors Bayburina, Ivashkovskaya (2007); Bayburina, Golovko (2008); Bayburina, Golovko (2009), the following IC structure is used: human capital, process capital, client capital, innovation capital, and network capital. In order to reach the objectives of the current research the structure of IC, developed in the above-mentioned research, was transformed to the following hierarchy of components (human capital, process capital, client capital, innovation capital, network capital) and the second – level sub-components of IC (*trainings of employees, R&D expenses, et c. .*)

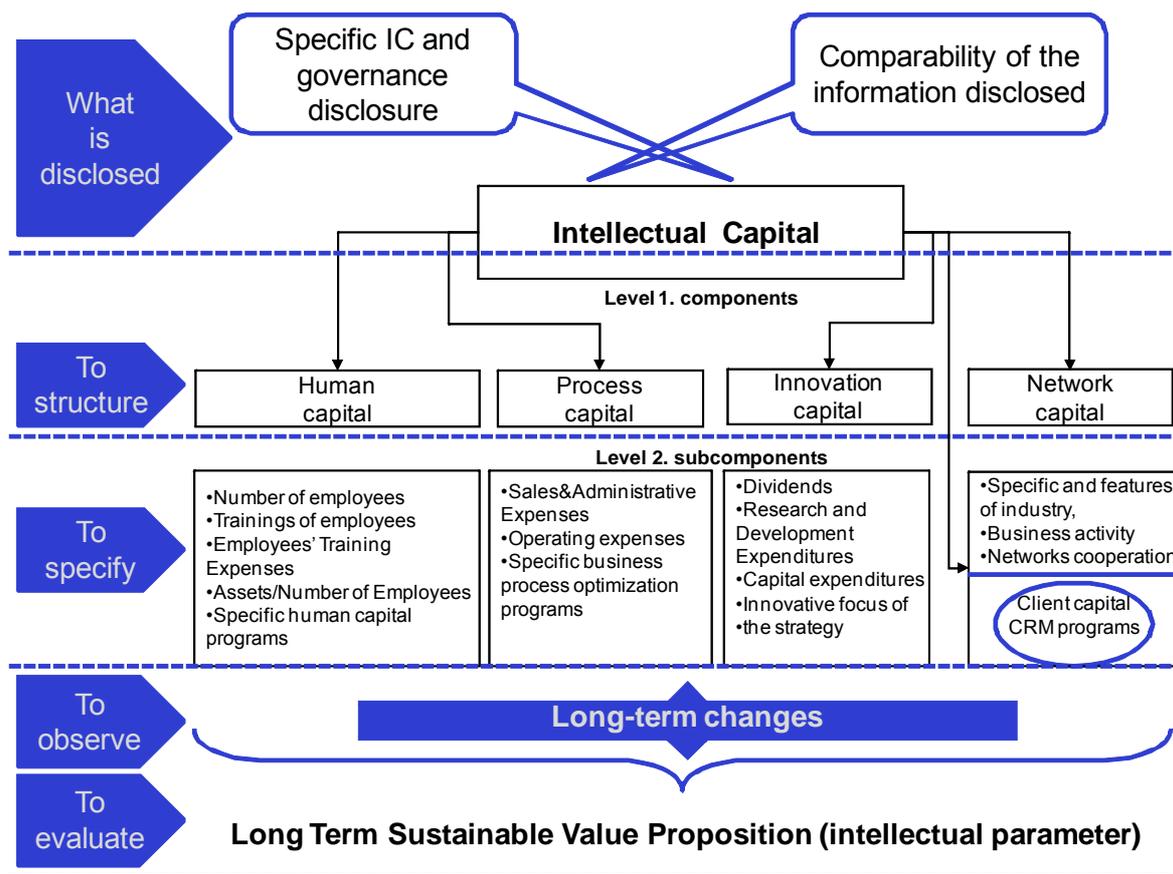


Figure 5: Structure of IC

2.2 Hypotheses

The process of *intellectual capital accumulation of BRIC companies* is over time and it can be measured according to the long run panel data analysis not less than 5 years. To realize the panel econometric analysis the data of the BRIC companies are to be comparable. The basic assumption of this article is that the information used in this research is public (is legible to disclosure) and can be considered by potential investors and all other external interested parties and stakeholders.

To realize the main goal of this research the four components of *intellectual capital* will be investigated: *human capital, process capital, innovation capital and network capital*. The authors suppose that the *client capital* for the purpose of the comparable principle of the panel data research of BRIC companies is less appropriate taking into consideration the features of the disclosed. According to the previous research of the large Russian companies only 4 components of *Intellectual capital* were significant.

- human capital (expenses for trainings of employees, total assets/number of employees),
- innovation capital (delta investment, delta dividend payout),
- process capital (sales & administrative costs),
- network capital (the existence of controlling shareholder).

To conduct this research over BRIC companies it is important to design the hypothesis and comparable subcomponents of *intellectual capital*, or the elements of the second level. The influence of these subcomponents on *the intellectual value* will be estimated and discussed.

Authors of the research designed the following hypotheses:

Hypothesis 1. Positive influence of human capital subcomponents on the Intellectual value of the company.

Employees of companies can be regarded as one of the most valuable assets: the financial crisis has proved this statement. The benchmark companies in all industries have been making attempts to support the key staff, which possesses the accrued skills and is loyal to the company. Such companies prefer not to hire new employees, companies prefer to retain and to develop the existing team.

Human capital can be regarded as the "latent source" of the value growth and this research verifies such hypothesis. Ballester, Livnat and Sinka (2002) investigate the market reaction on the chosen level of personnel expenses with the usage of the approach analyzed by Ohlson (1995). The authors investigate which part of the personnel expenses the market considers as an investment in the staff. This is not the easy matter to define what part of the personnel expenses is the investment part. However, the authors of this research tend to think that in reality it is important how much the company pays the personnel in general, whether to consider separately the importance of salary and human capital investment. Due to the fact that large BRIC companies are the companies from various industries, therefore their role in the process of value creation is probably distinct, thus the influence of the human capital subcomponents which characterize specific features of the organization may vary from company to company.

The authors of this research suppose that the indicator of the usage of assets, which is calculated as the total assets divided by number of employees, characterizes the efficiency of usage of the company's assets by its employees and positively affects the *Intellectual value* of the company, the same approach was executed by Scandia.

Hypothesis 2. Positive influence of operating expenses as the subcomponent of the process capital on the Intellectual value of the company.

Operating expenses reflect the level of the expenditures spent on the maintaining of the production process and can be regarded as a proxy variable for measuring the company's process efficiency; the same approach was executed by Scandia.

Hypothesis 3. Direct influence of capital expenditures as a subcomponent of the innovation capital on the Intellectual value of the company.

It is assumed by the authors that if the company has the opportunity and bears substantial capital expenditures, the company may have more opportunities and can qualitatively improve its production, intensifies, renews and creates assets. The capital expenditures as the indicator reflects the possibility of the company to implement innovations, its direction towards the optimization of the current assets structure, replacement of old equipment by new more productive one. Consequently, it is possible to conclude that by means of new equipment the company increases the probability of its own growth.

Hypothesis 4. Reverse influence of the dividends paid as a subcomponent of the innovation capital on the Intellectual value of the company.

Dividend policy can be considered as one of the crucial parts of the implemented financial policy due to the ambiguity. The irrelevance of dividend policy towards the corporate value under the terms and conditions of the perfect market was shown in the research of Miller and Modigliani (1961). The main focus of the research in such a field according to the stakeholders' theory is the influence of dividends towards the corporate value. From the one hand, the increase of dividends usually leads to a decrease of reinvestment in business, from the other hand dividends are considered to be a signal for the market, however such a signal may have either a positive, an improvement of the financials, or a negative nature of the influence, the change of the ownership due to a possible financial distress. In case of the inefficiency and the imperfection of capital markets the dividend policy may affect the price of the shares and also may increase liquidity of the company's shares.

Nonetheless, according to the framework of this research the dividend policy of the company is analyzed from the positions of the signaling theory. Companies with the higher level of intellectual capital tend to pay fewer dividends as the signal that they intend to implement responsibilities towards all stakeholders. In addition the smaller dividend payout is considered as a signal of intentions to invest in the sustainable development of the company.

Hypothesis 5. Positive influence of R&D expenses on the Intellectual value of the company.

Research and Development Expenses, R&D expenses form a long-term basis for the company's future development and therefore for future growth of its intellectual value. Thus, Bublitz, Ettredge (1989) have concluded that the market value of the company may fluctuate according to the dynamics of R&D expenses, because the market regards such expenses not as costs of the company, but as the future development investment. Corresponding results obtained Chaucin and Hirschey (1993); Green, Stark and Thomas (1996).

Hypothesis 6. Significant influence of a particular time period on the Intellectual value of the company.

According to the framework of this research it is assumed that in the period of the rapid growth of the market the factor of the "particular year" can influence the intellectual value. The rapid growth of the market capitalization of companies in the regarded period 2004-2007, the economic crunch in 2008 for sure tend to influence the intellectual value, but in its own particular way, therefore a set of year-dummy variables was introduced into the research model.

Hypothesis 7. Significant influence of a particular industry on the Intellectual value of the company.

According to the expected influence of the particular industry on the possibility of the intellectual value creation a set of industry-dummy variables was introduced into the research model.

2.3 Research model

The main goal of this research is to evaluate the influence of particular components of the *intellectual capital* on the *Intellectual value* of BRIC companies. To reach the main goal of the research the special research model has been introduced and a series of linear regression tests has been held.

The value created primarily due to the internal integration of *intellectual capital* components is the *Intellectual value of the company*. The accumulation of the intellectual capital is the over time process, not less than 5 years of the research should be taken into the consideration. The *Intellectual value* of the company can be calculated as the delta between market and book values of the company's equity in purposes of this research in the period of 2004-2008.

2.3.1 Research model. dependent variable.

Intellectual Enterprise Value as the dependent variable is the value created primarily by internal integration of *intellectual capital* components, IEV_{it} , calculated in US dollars as of the formulae:

$$(1) IEV_{it} = \text{Market Value of Equity}_{it} - \text{Book Value of Equity}_{it},$$

Where

i – the BRIC company index

t – the year index.

$$(2) \text{Market Value of Equity}_{it} = N_shares \times \text{Last Price},$$

Where

N_shares – number of shares in circulation;

Last Price – last available price (in the corresponding period).

$$(3) \text{Book Value of Equity}_{it} = \text{Pref_shares} + \text{Minor_Int} + \text{Ord_shares},$$

Where

Pref_shares – preferred shares;

Minor_Int – minority interest;

Ord_shares – ordinary shares.

Due to the fact that from the one hand fundamental variables should be included to the research model of *intellectual capital* influence on the intellectual value, from the other hand certain comparable components and subcomponents of *intellectual capital*, independent variables, should be included into the research model.

According to the principle of comparability and principle of long-term analysis the empirical research on BRIC countries is highly limited due to a specific level of the *intellectual capital* information disclosure for a particular company, particular industry, and even particular country of the BRIC group. Therefore the model does not include *specific subcomponents measured by IC Occurrences Variables technique*, as it was in the research of Bayburina (2007).

According to all limitations and principles of the analysis the basic research model can be presented as following:

$$(4) IEV_{it} = \alpha + (\rho_{1it}, \dots, \rho_{nit}) \times IC + \beta_{it} \times FV + \varepsilon_{it}$$

where

IC – a vector of intellectual capital subcomponents;

FV – a vector of fundamental variables;

ε – a vector of random errors (“white noise”).

2.3.2 Research model. independent variables. fundamentals

The model includes a range of fundamental variables for comparison its influence on the *Intellectual value* correspondingly with the influence of *intellectual capital* components on the dependent variable.

Consequently the model includes the following variables.

a) Total revenues of the goods sold less adjustment on returns, discounts, insurance payouts, tax on sales, value added tax, *Sales_{adj}*

In general the meaning of variable is calculated in US dollars and reflects the level of the stated financial indicator on the date of December, 31 of each regarded year. Unless otherwise specified.

b) Book value of Assets, in US dollars, *TA*

c) Net Assets, in US dollars, *NA*

The meaning of the variable is calculated as follows :

(5) Net Assets = Assets – Current Assets – Long Term Borrowings - Other long-term liabilities,

d) Net income, in US dollars, *NI*

The profits after all expenses have been deducted. Net income includes the effects of all one-time, non-recurring, and extraordinary gains, losses, or charges.

e) Return on Assets, %, *ROA*

The meaning of the variable is calculated as follows:

(6) $ROA = ((Net\ Income - Pref_payments) / Assets_avg) \times 100,$

Where

Net Income – net income for the period (calendar year);

Pref_payments - total cash preferred dividends for the same period;

Assets_avg – average value of assets for the ended financial year (calendar year).

f) Return on equity, %, *ROE*

The meaning of the variable is calculated as follows:

$$(7) ROE = ((Net\ Income - Pref_payments) / Ord_shares_avg) \times 100,$$

where

Net Income – net income for the period (calendar year);

Pref_payments - total cash preferred dividends for the last 12 months;

Ord_shares_avg – average value of ordinary shares.

g) Earnings before interest, taxation, depreciation and amortization, in US dollars, *EBITDA*

The meaning of variable is calculated as follows:

$$(8) EBITDA = Operating\ Income - D\ \&\ A,$$

where

Operating Income – income from the company's operating activity;

D&A – depreciation and amortization.

h) EBITDA growth rate, %, a percent change of EBITDA from the previous period to the regarded period, *EBITDA_GROWTH*,

i) Earnings before interest and taxation, in US dollars, *EBIT*

j) Natural logarithm of the company's value of assets (as a proxy variable for the company's size), *LN_TA*.

Fundamental variables will also be included into the model as control variables, the combination of such variables in the model will be defined during the research process.

2.3.3 *Research model. independent variables. components and subcomponents of intellectual capital*

Proxy variables for the research were grouped as follows.

a) **Human capital.** Personnel expenses reflect "the intention" of the company to invest in its employees.

1) Personnel expenses, in US dollars, *PE*

The figure includes wages and salaries, social security, pension, profit-sharing expenses and other benefits related to personnel.

b) **Human capital.** Efficiency of the company's assets usage by its employees;

1) Number of employees; *N*

2) Total Assets/Number of employees, *TA/Nempl*

c) **Process capital.**

1) Operating expenses, in US dollars, *OE*

Indirect operating expenses after *Cost of Goods Sold*. If there is no breakdown between *Cost of Goods Sold* and *SG&A*, it includes the entire amount which represents total operating expenses. Includes amortization of intangibles including goodwill and stock-based compensation.

d) **Innovation capital.** Measures implemented to support the long-term growth of the company.

1) Capital expenditures, in US dollars, *Capex*

2) Dividends paid, in US dollars, *DVD*

The figure includes dividends actually paid out as cash disbursements including both common stock of the parent company and preferred stock of all consolidated companies.

3) R&D Expenses, in US dollars, *RND*

Research and development expenditures incurred in the fiscal period.

e) **Network capital.** The influence of a particular time period was included into the model. The influence of the economic upturn business activity, 2004-2007 is connected close to the possibility of creating value networks among companies. The period of downturn and compressing of the business activity in 2008 and features of each industry on the development of the company were included into the model.

A set of corresponding dummy variables, which are proxy variables for estimation of each year influence, was included into the model.

a) D^{04} - equals "1", if the year is 2004 и "0" otherwise;

b) D^{05} - equals "1", if the year is 2005 и "0" otherwise;

c) D^{06} - equals "1", if the year is 2006 и "0" otherwise;

d) D^{07} - equals "1", if the year is 2007 и "0" otherwise;

e) D^{08} - equals "1", if the year is 2008 и "0" otherwise;

A set of corresponding dummy variables, which reflect industry influence, was included into the model.

a) I^{01} - equals "1", if industry *i* in year *t* is industry «*Basic materials*», and "0" otherwise;

b) I^{02} - equals "1", if industry *i* in year *t* is industry «*Telecommunications*», and "0" otherwise;

c) I^{03} - equals "1", if industry *i* in year *t* is industry «*Consumer goods (cyclical)*», and "0" otherwise;

d) I^{04} - equals "1", if industry *i* in year *t* is industry «*Consumer goods (non-cyclical)*», and "0" otherwise;

e) I^{05} - equals "1", if industry *i* in year *t* is industry «*Diversified production*», and "0" otherwise;

f) I^{06} - equals "1", if industry *i* in year *t* is industry «*Energy*», and "0" otherwise;

g) I^{07} - equals "1", if industry *i* in year *t* is industry «*Financial*», and "0" otherwise;

h) I^{08} - equals "1", if industry *i* in year *t* is industry «*Industrial production*», and "0" otherwise;

i) I^{09} - equals "1", if industry *i* in year *t* is industry «*Technology*», and "0" otherwise;

j) I^{10} - equals “1”, if industry i in year t is industry «Utilities», and “0” otherwise;

Model of the research therefore is:

$$(9) IEV_{it} = \alpha + (\rho_{1it}, \dots, \rho_{nit}) \times HC + \beta_{it} \times OE_{it} + \gamma_{1it} \times Capex_{it} + \gamma_{2it} \times DVD + \gamma_{3it} \times RND_{it} + (\delta_{1it}, \dots, \delta_{nit}) \times I + (\eta_{1it}, \dots, \eta_{nit}) \times D + \varepsilon_{it}$$

Where

HC – a vector of subcomponents of the human capital;

OE – operating expenses;

Capex – capital expenditures;

DVD – dividends paid;

RND – R&D expenses;

I – a vector of dummy variables which reflect the influence of a particular time period;

D – a vector of dummy variables which reflect the influence of a particular industry of the economy;

ε – a vector of random errors (“white noise”).

Table 1 provides hypothetical signs of connection between the dependent variable and the independent variables.

Table 1: Hypothetical signs in the model

Independent variables	Hypothetical sign of connection with the dependent variable
Sales _{adj}	+
Net Assets	+
Total Assets	+
Net income	+
ROE	+
LN(Total Assets)	+
ROA	+
EBITDA	+
EBITDA Growth rate	+
EBIT	+
Personnel Expenses	+
Total Assets/Number of employees	+
Number of employees	+
Operating expenses	+
Capital expenditures	+
Dividends paid	-
Research & Development Expenses (R&D Expenses)	+
Industry influence	Significant
Time period influence	Significant

2.4 Sample and sources of data

The sample was formed according to the goal of the research. According to the principle of comparability the standard of public corporate reports became a primary criterion for BRIC sample selection.

In the initial stage of the BRIC research the following criterion was formed: the company should have IFRS financial reports in the long-term persistent period during at least 3 years. Indian and Brazilian companies were not included in the sample (top-5 in each country), such as Brazilian Petrobras and one of the Indian largest companies ONGC do not have IFRS financial reports in the period earlier than 2005 year. Also the principle of long-term panel data not less than 5 years analysis was not

executed. Thus, to make a representative and comparable sample of these companies with the usage of IFRS financial reports was impossible.

In terms of implementation the aims of the research a new criteria was formed for financial reports of the companies: companies should have financial reports along with the National GAAP accounting standards, therefore the sample includes BRIC companies and the research period has been extended not less than 5 years due to the fact the main constraint of IFRS reports availability was removed.

The final research sample was formed along with the following criteria:

- a) Market capitalization of each company at the end of the second quarter of 2009 was not less than \$200 mln, thus the sample consists of rather large companies, which despite the downturn of the world economy were able to retain market capitalization at high level. The data source is Bloomberg.
- b) Information of bids and prices is available for the period of 2004-2008. The data source is Bloomberg.
- c) The availability of corporate accounting reports prepared according to GAAP accounting standards to make the results comparable since 2004 till 2008 years. The data source is Bloomberg.
- d) The existence and feasibility of a corporate web-site which provides sufficient information of the companies.
- e) Along with all the criteria being met the final sample was formed and it includes 115 companies from BRIC countries, representing companies of 10 industries.

In this research three subsamples were collected BRIC sample, Brazil-China sample, India – Russia sample. The foregoing samples have been regarded in the period of economic upturn of the 2000-s as “leaders” and “pushovers”, correspondingly, see Figures 6,7,8,9.

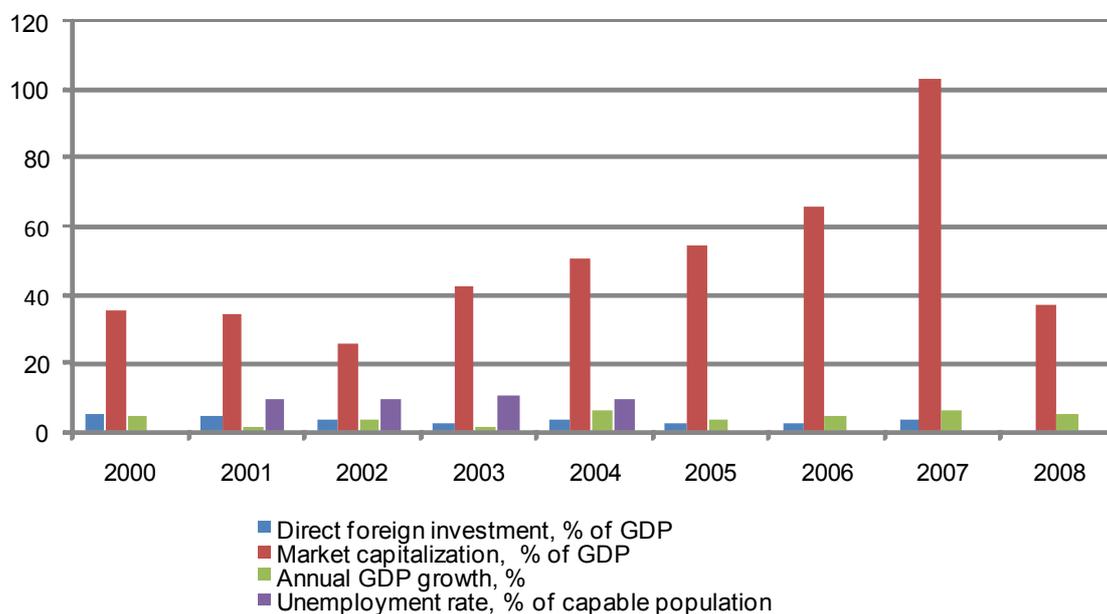


Figure 6: Brazil main macroeconomic indicators

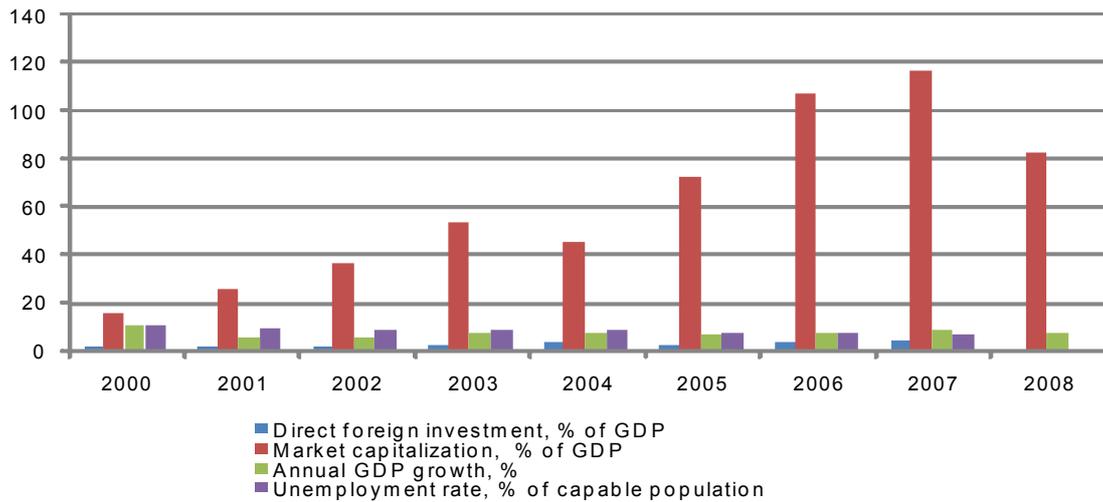


Figure 7: Russia main macroeconomic indicators

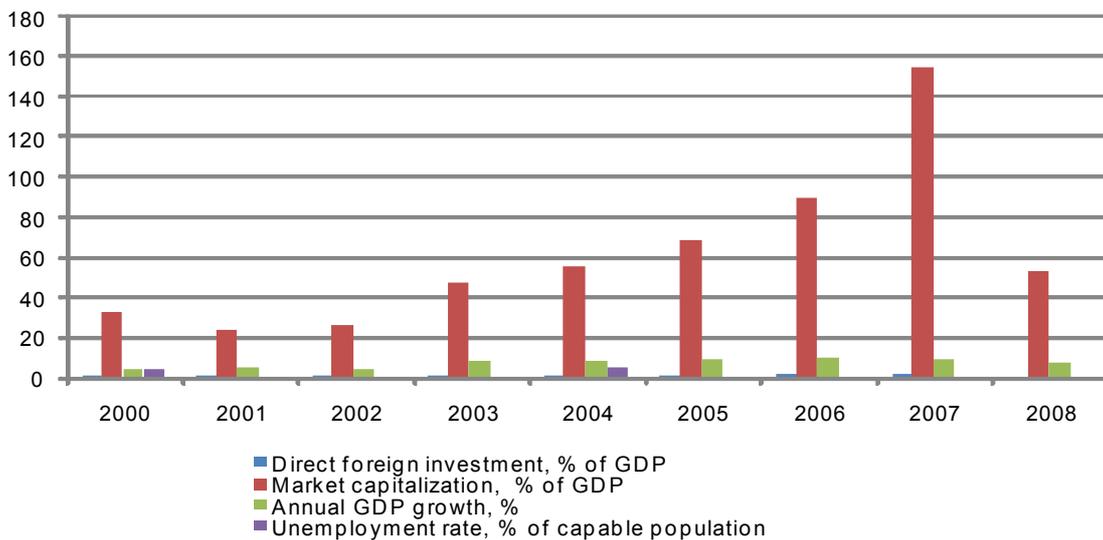


Figure 8: India main macroeconomic indicators

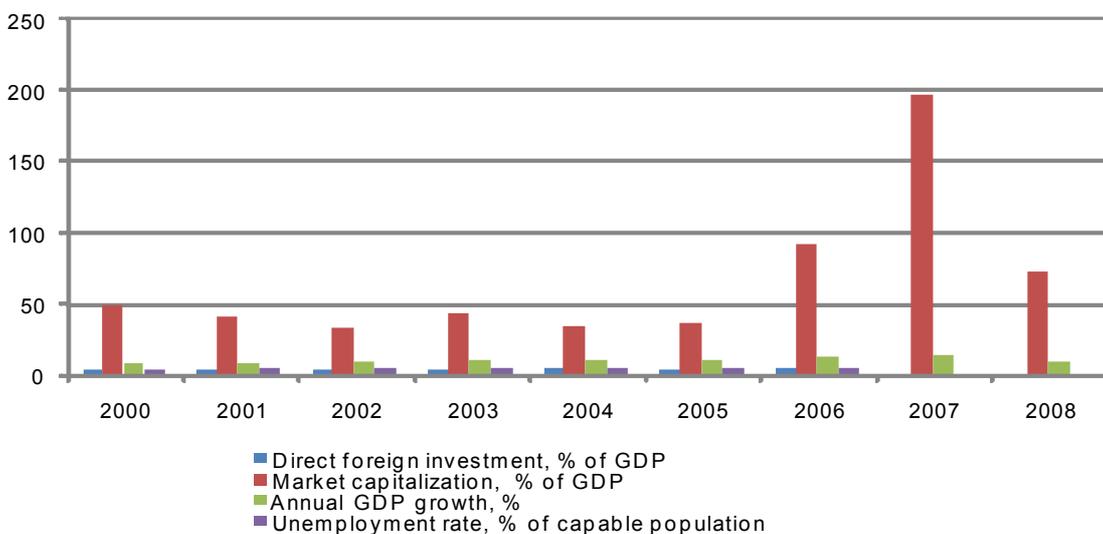


Figure 9: China main macroeconomic indicators

Table 2: BRIC sample

№	Name of the BRIC company	Industry	Country
1	Petroleo Brasileiro SA	Energy	Brazil
2	Vale SA	Basic materials	Brazil
3	Cia de Bebidas das Americas	Consumer goods (non-cyclical)	Brazil
4	Usinas Siderurgicas de Minas Gerais SA	Basic materials	Brazil
5	CPFL Energia SA	Utilities	Brazil
6	Telemar Norte Leste SA	Telecommunications	Brazil
7	Tractebel Energia SA	Utilities	Brazil
8	Bradespar SA	Financial	Brazil
9	Weg SA	Industrial	Brazil
10	Cia Paranaense de Energia	Utilities	Brazil
11	Empresa Brasileira de Aeronautica SA	Industrial	Brazil
12	Cia De Transmissao De Energia Eletrica Paulista	Utilities	Brazil
13	Ampla Energia e Servicos SA	Utilities	Brazil
14	EDP - Energias do Brasil SA	Utilities	Brazil
15	Duke Energy International Geracao Paranapanema SA	Utilities	Brazil
16	Totvs SA	Technology	Brazil
17	Equatorial Energia SA	Utilities	Brazil
18	Cia Energetica do Rio Grande do Norte	Utilities	Brazil
19	Centrais Eletricas de Santa Catarina SA	Utilities	Brazil
20	Companhia Estadual de Geracao e Transmissao de Energia Eletrica	Utilities	Brazil
21	Mahle-Metal Leve SA Industria e Comercio	Consumer goods (cyclical)	Brazil
22	Itautec SA - Grupo Itautec	Technology	Brazil
23	Cia Energetica de Pernambuco	Utilities	Brazil
24	Lukoil OAO	Energy	Russia
25	Novolipetsk Steel OJSC	Basic materials	Russia
26	Mobile Telesystems OJSC	Telecommunications	Russia
27	Tatneft	Energy	Russia
28	Mechel	Basic materials	Russia
29	Sistema JSFC	Telecommunications	Russia
30	Moscow City Telephone	Telecommunications	Russia
31	Vsmo-Avisma Corp	Industrial	Russia
32	Cherkizovo Group OJSC	Consumer goods (non-cyclical)	Russia
33	Oil & Natural Gas Corp Ltd	Energy	India
34	NTPC Ltd	Utilities	India
35	Infosys Technologies Ltd	Technology	India
36	Larsen & Toubro Ltd	Industrial	India
37	Maruti Suzuki India Ltd	Consumer goods (cyclical)	India

No	Name of the BRIC company	Industry	Country
38	Tata Steel Ltd	Basic materials	India
39	Hero Honda Motors Ltd	Consumer goods (cyclical)	India
40	Sun Pharmaceutical Industries Ltd	Consumer goods (non-cyclical)	India
41	National Aluminium Co Ltd	Basic materials	India
42	Nestle India Ltd	Consumer goods (non-cyclical)	India
43	ABB Ltd/India	Industrial	India
44	Hindustan Petroleum Corp Ltd	Energy	India
45	GlaxoSmithKline Pharmaceuticals Ltd	Consumer goods (non-cyclical)	India
46	Dabur India Ltd	Consumer goods (non-cyclical)	India
47	Lupin Ltd	Consumer goods (non-cyclical)	India
48	Ultratech Cement Ltd	Industrial	India
49	Piramal Healthcare Ltd	Consumer goods (non-cyclical)	India
50	Cadila Healthcare Ltd	Consumer goods (non-cyclical)	India
51	Thermax Ltd	Industrial	India
52	Godrej Industries Ltd	Basic materials	India
53	Glenmark Pharmaceuticals Ltd	Consumer goods (non-cyclical)	India
54	Financial Technologies India Ltd	Technology	India
55	Jain Irrigation Systems Ltd	Industrial	India
56	Shree Cement Ltd	Industrial	India
57	Tata Tea Ltd	Consumer goods (non-cyclical)	India
58	Ashok Leyland Ltd	Consumer goods (cyclical)	India
59	Marico Ltd	Consumer goods (non-cyclical)	India
60	GlaxoSmithKline Consumer Healthcare Ltd	Consumer goods (non-cyclical)	India
61	Voltas Ltd	Industrial	India
62	Procter & Gamble Hygiene & Health Care Ltd	Consumer goods (non-cyclical)	India
63	Century Textile & Industries Ltd	Diversified	India
64	Rashtriya Chemicals & Fert	Basic materials	India
65	Chennai Petroleum Corp Ltd	Energy	India
66	Aventis Pharma Ltd	Consumer goods (non-cyclical)	India
67	Blue Star Ltd	Industrial	India
68	Madras Cements Ltd	Industrial	India
69	Coromandel International Ltd	Basic materials	India
70	Pfizer Ltd/India	Consumer goods (non-cyclical)	India
71	Torrent Pharmaceuticals Ltd	Consumer goods (non-cyclical)	India
72	Apollo Tyres Ltd	Consumer goods (cyclical)	India
73	Kirloskar Oil Engines Ltd	Industrial	India
74	ICI India Ltd	Basic materials	India
75	AstraZeneca Pharma India Ltd	Consumer goods (non-cyclical)	India
76	3M India Ltd	Diversified	India
77	Wockhardt Ltd	Consumer goods (non-cyclical)	India

No	Name of the BRIC company	Industry	Country
78	Ipca Laboratories Ltd	Consumer goods (non-cyclical)	India
79	Godfrey Phillips India Ltd	Consumer goods (non-cyclical)	India
80	Praj Industries Ltd	Industrial	India
81	Novartis India Ltd	Consumer goods (non-cyclical)	India
82	Lakshmi Machine Works Ltd	Industrial	India
83	CMC Ltd	Technology	India
84	Nagarjuna Fertilizers & Chemicals	Basic materials	India
85	BOC India Ltd	Basic materials	India
86	Amara Raja Batteries Ltd	Industrial	India
87	Orchid Chemicals & Pharmaceuticals Ltd	Consumer goods (non-cyclical)	India
88	Chettinad Cement Corp Ltd	Industrial	India
89	Bannari Amman Sugars Ltd	Consumer goods (non-cyclical)	India
90	Bajaj Electricals Ltd	Industrial	India
91	Ingersoll-Rand India Ltd	Industrial	India
92	China Hongxing Sports Ltd	Consumer goods (non-cyclical)	China
93	Pine Agritech Ltd	Consumer goods (non-cyclical)	China
94	Ying Li International Real Estate Ltd	Consumer goods (cyclical)	China
95	Tianjin Zhong Xin Pharmaceutical Group Corp Ltd	Consumer goods (non-cyclical)	China
96	People's Food Holdings Ltd	Consumer goods (non-cyclical)	China
97	Konka Group Co Ltd	Consumer goods (cyclical)	China
98	BOE Technology Group Co Ltd	Technology	China
99	Yantai Changyu Pioneer Wine Co	Consumer goods (non-cyclical)	China
100	Inner Mongolia Yitai Coal Co	Energy	China
101	Chongqing Changan Automobile Co Ltd	Consumer goods (cyclical)	China
102	Changchai Co Ltd	Industrial	China
103	Weifu High-Technology Co Ltd	Consumer goods (cyclical)	China
104	Shanghai Diesel Engine Co Ltd	Industrial	China
105	Eastern Communications Co Ltd	Telecommunications	China
106	Shanghai Baosight Software Co Ltd	Technology	China
107	Lao Feng Xiang Co Ltd	Consumer goods (cyclical)	China
108	Jinan Qingqi Motorcycle Co	Consumer goods (cyclical)	China
109	Shanghai Yaohua Pilkington Glass Co Ltd	Industrial	China
110	Wuxi Little Swan Co Ltd	Consumer goods (cyclical)	China
111	Shanghai Highly Group Co Ltd	Industrial	China
112	Hefei Meiling Co Ltd	Consumer goods (cyclical)	China
113	Kama Co Ltd	Industrial	China
114	Shenzhen Textile Holdings Co Ltd	Consumer goods (cyclical)	China
115	Wafangdian Bearing Co Ltd	Industrial	China

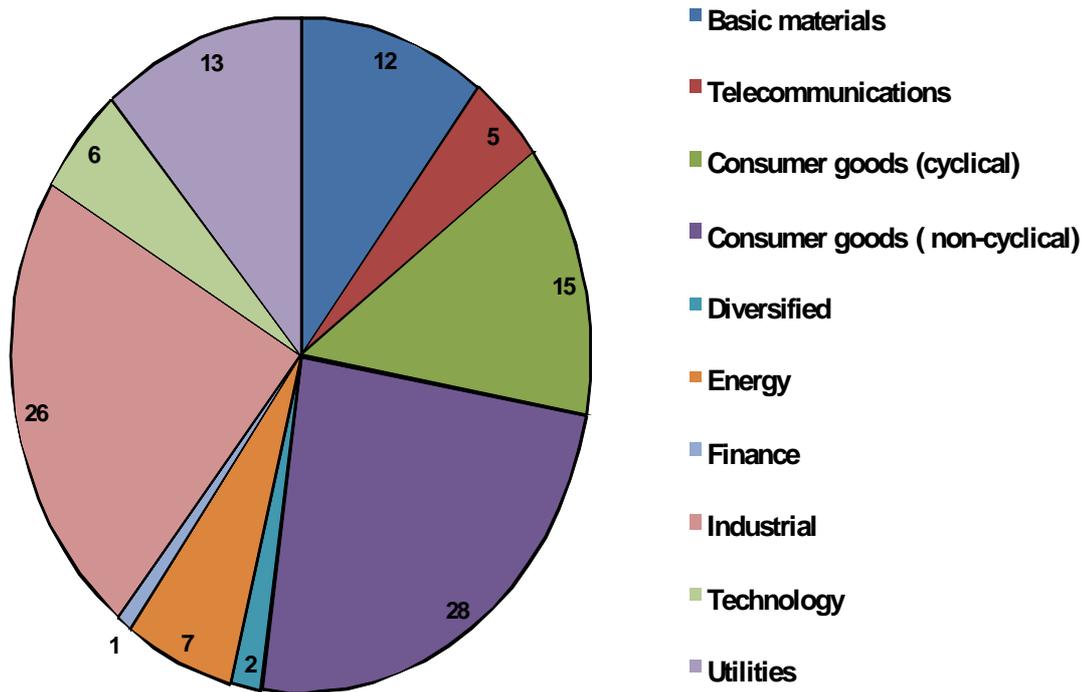


Figure 10: The structure of BRIC sample

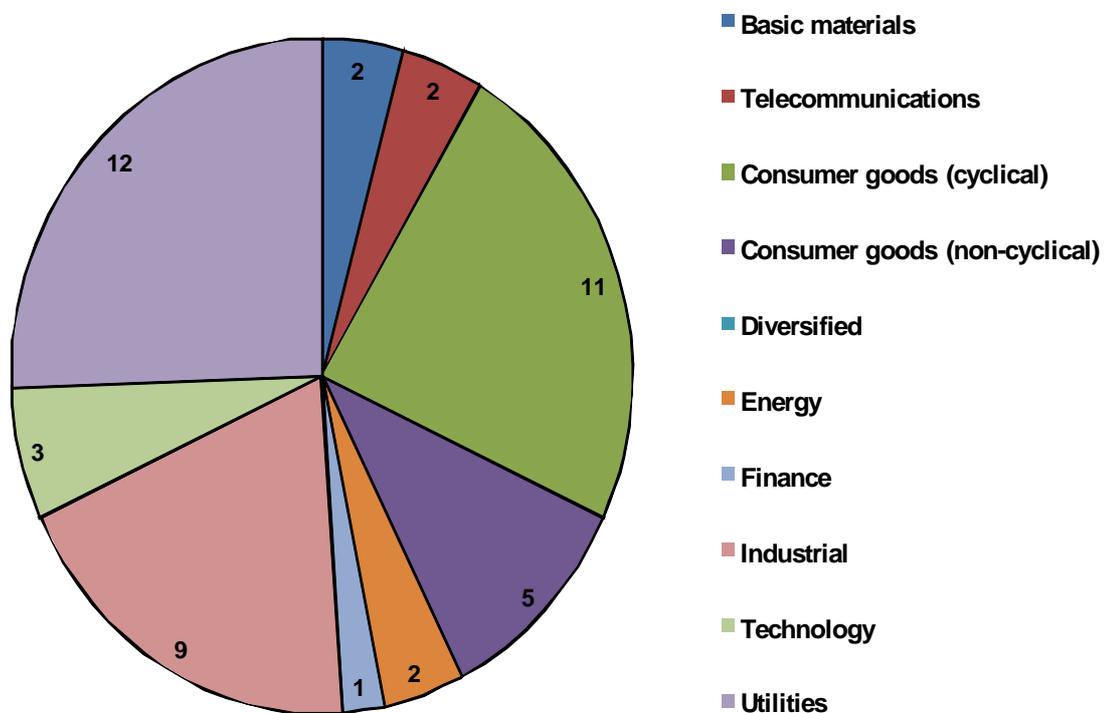


Figure 11: The structure of Brazil-China sample

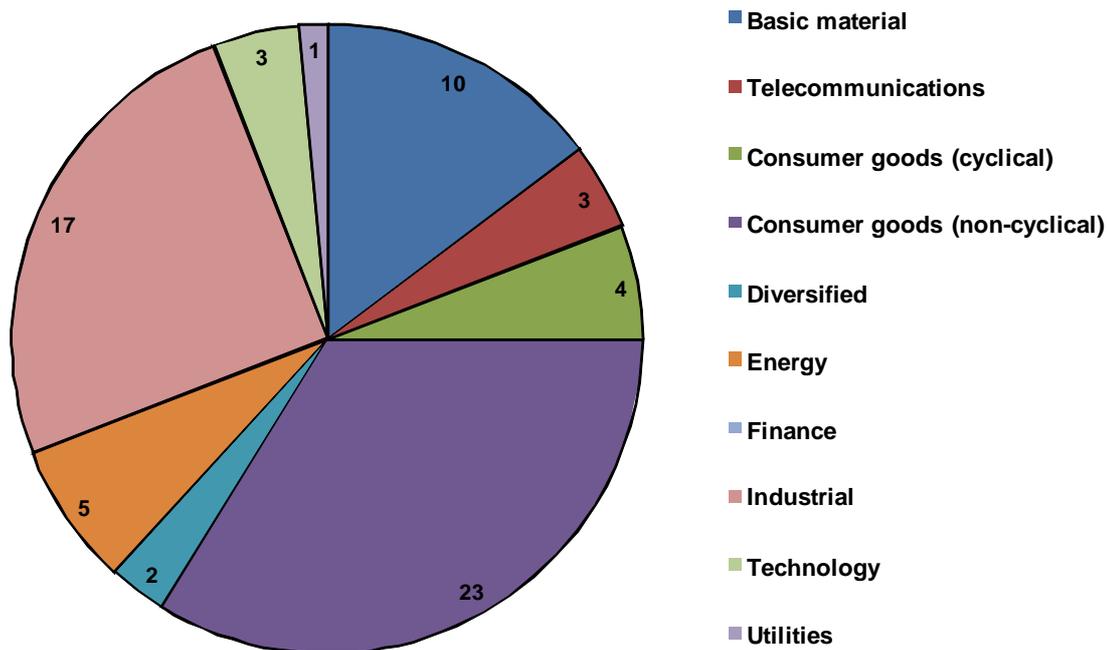


Figure 12: The structure of India-Russia sample

3. Results

3.1 Data analysis:

- a) Test for normality of variables distribution, to fulfil the task a corresponding test for normality was held (Skewness-Kurtosis Test for Normality). All variables of BRIC sample are normally distributed.

Data verification was held by the means of correlation analysis, special tests for multicollinearity. Various types of OLS regression models were tested and VIF-tests for two samples were held. Distinct models were chosen with meanings of VIF-tests not greater than critical levels, 10 for individual VIF meanings and 6 for average meanings for group of factors according to the Stata criteria and thereon the final model of the research was chosen. The meaning of VIF contributed to 1,61 for the chosen set of variables in the sample for four countries.

- b) All variables of subsample “Brazil-China” are normally distributed. The meaning of VIF contributed to 2,25 for the chosen set of variables in subsample.
- c) All variables of subsample “India-Russia” are normally distributed. The meaning of VIF contributed to 5,91 for the chosen set of variables in subsample.

3.2 Multiple linear regression model

In order to evaluate the influence of each independent factor a series of linear regression tests has been held for each determined sample: BRIC, Brazil-China, India-Russia.

i. As the final model of the research the authors of this article have chosen the model in which all the factors are significant (at no less than 5% level of significance). For the chosen BRIC models specification tests were held, tests for model specification selection which reflects temporal structure of the data available.

The authors have carried out the Wald Test, Breusch-Pagan Test, Hausman Test:

- a) Wald test showed that the Pooled-up model is rejected compared to the Fixed Effect model.

b) Breusch-Pagan test showed that Pooled-up model is rejected compared to the Random Effect Model.

c) Hausman test showed that the Fixed Effect model is rejected compared to the Random Effect Model.

According to the results of the tests the following model with the Random Effect was chosen for the BRIC sample. According to the results the Random effect model of the regression has been chosen. So the basic criterion was the highest value of the Wald statistics (1109,88).

Table 3: BRIC model specification

Test	Statistics
Wald test	F test that all $u_i=0$: $F(4, 314) = 70,13$ Prob > F = 0.0000
Breusch-Pagan test	$\chi^2(1)=10,80$ Prob > $\chi^2=$ 0,0010
Hausman test	$\chi^2(4)=6,40$ Prob > $\chi^2=$ 0.1712

The final model with the Random Effect for the BRIC sample is presented below:

$$(10) IEV_{it} = 790,09 + 0,34TA_{it} + 4,59PE_{it} - 7,78DVD_{it} - 2536,87 I^{01}_{it} - 3851,39 I^{02}_{it} - 3524,7D^{08}_{it}$$

The subcomponents of human capital such as personnel expenses and the subcomponents of innovation capital such as dividends paid are significant. The reverse dividends hypothesis is confirmed: the less are the paid dividends, the more is the *Intellectual value* of the company. The widespread example is the company of W. Buffett Berkshire Hathaway. This company for years didn't pay dividends. Before the crisis the increase of the prices of shares was guaranteed so that shareholders were absolutely sure to sell the shares in several years so that would get much more benefits without dividends (no doubt that the taxation issue is also worth of the consideration to finalize the discussion).

The influence of the telecommunications industry is significant and negative, that means that *Intellectual value* of the companies of this industry was destroyed through the investigated period. Year 2008 can be considered as the first year of the economic downturn, the period of 2000-2007 is the world economy upturn especially concerning the emerging markets. The influence of the 2008 year is significant and negative in the model. The book value of assets is the significant fundamental variable, but its "weight" is quite small.

The long-term data analysis gives the opportunity to eliminate speculative value fluctuations. Accordingly the accumulation of the *intellectual capital* is the time-demanding process: the performance should be evaluated over the long-run horizon. The meaning of the constant in final BRIC model is positive, that means that in general the *Intellectual Value* of the BRIC companies was increasing over the investigated period 2004-2008. However according to the results of the former research of Russian and Chinese companies Bayburina, Golovko (2008) the constant in the model was negative over the investigated period of 2002-2007, we can admit that the world economy was overheated till 2007 year, despite all the development programs the *Intellectual Value* of the large companies was destroying.

ii. For the chosen Brazil-China models specification tests were held, tests for model specification selection which reflects temporal structure of the data available. The authors have carried out the Wald Test, Breusch-Pagan Test, Hausman Test:

a) Wald test showed that the Pooled-up model is rejected compared to the Fixed Effect model.

b) Breusch-Pagan test showed that Pooled-up model is rejected compared to the Random Effect Model.

c) Hausman test showed that the Fixed Effect model is not rejected compared to the Random Effect Model.

The sample of companies in the research is closer to the general (universal) set than the fixed set of data, the Random Effect model is more appropriate than the Fixed Effect model. According to the

results of the tests the following model with the Random Effect was chosen for the Chian-Brazil sample.

Table 4: Brazil-China model specification

Test	Statistics
Wald test	F test that all $u_i=0$: $F(4, 84) = 37,73$ Prob > F = 0.0000
Breusch-Pagan test	$\chi^2(1)=12,10$ Prob > $\chi^2=$ 0.0005
Hausman test	$\chi^2(3)=16,12$ Prob > $\chi^2=$ 0.0011

For the subsample Brazilian and Chinese companies the final model with Random effect was chosen, Wald statistics is acceptable (444,46). The final model with the Random Effect for Brazilian and Chinese sample is presented below:

$$(11) IEV_{it} = -2389,14 + 0,23TA_{it} + 11,78PE_{it} - 7,40DVD_{it} + 6067,32 D^{07}_{it}$$

The dividends paid, personnel expenses are significant. The last year of the growth stage (2007) year makes a contribution to the increase of the IEV. The negative constant testifies the effect that the IEV of large Brazilian and Chinese companies was destroying year by year. However the data panel is long-term concerning the history of listing and the companies in the sample are the largest ones, so accordingly the variable of total assets is significant. The insignificant variables are not included into the model.

iii. For the chosen India-Russia models specification tests were held, tests for model specification selection which reflects temporal structure of the data available. The authors have carried out the Wald Test, Breusch-Pagan Test, Hausman Test:

- Wald test showed that the Pooled-up model is rejected compared to the Fixed Effect model.
- Breusch-Pagan test showed that Pooled-up model is rejected compared to the Random Effect Model.
- Hausman test showed that the Fixed Effect model is rejected compared to the Random Effect Model.

Table 5: India-Russia model specification

Test	Statistics
Wald test	F test that all $u_i=0$: $F(61, 224) = 2,21$ Prob > F = 0.0000
Breusch-Pagan test	$\chi^2(1)=8,24$ Prob > $\chi^2=$ 0.0041
Hausman test	$\chi^2(6)=38,04$ Prob > $\chi^2=$ 0.0000

The final model with Random Effect was chosen for the second subsample (Russia-India). The final criteria is Wald statistics (477,35). The final model with the Random Effect for Brazilian and Chinese sample is presented below:

$$(12) IEV_{it} = 275,23 - 0,44TA_{it} + 1,01PE_{it} - 14,51DVD_{it} + 6,7Capex_{it} + 3600,53 I^{09}_{it} + 1829,33 d^{07}_{it} - 3978,1 D^{08}_{it}$$

4. Results and managerial implications

Intellectual capital and its *components* can be regarded as the source for the company's *organic growth*. In the era of crisis, when most of financial reserves are unavailable the inner organizational efficiency by the means of *intellectual capital* is the question of the survival edge for most of large companies. *Intellectual capital* of the company and its components can be regarded as "*latent reserves*" of the long term value growth. *Intellectual capital* is the "intangible safety-cushion" and it can be used only by those companies who have created it years before and therefore have directed the cash flows for the purposes of "*sustainable wealth*" creation. The research of *intellectual capital* components and its role in the *value* creation and building its *competitive advantage* remain an actual topic for the empirical research, carried out in various countries and by different research centers.

Intellectual value of the company is a part of the total value, created through the process of the intellectual components' accumulation.

The main goal of this research is to evaluate by the means of the panel data analysis the influence of particular components of the *intellectual capital* on the *intellectual value* of BRIC companies. The process of *intellectual capital accumulation* is over time and it can be measured according to the long run panel data analysis not less than 5 years.

The panel data analysis revealed that the *human capital* can be considered the key factor of the *long-term growth* of BRIC companies of all industries. Employees and their competencies are this basis which has not undervalued whereas most of financial assets lost trust and its value. Some significant conclusions are made below:

- the statistically significant influence of human capital, innovation capital and network capital on the *Intellectual value* of large listed BRIC companies was found out;
- the significant influence (reverse) of dividends and personnel expenses on the *Intellectual value* in line with such indicators as capital expenditures and assets value was proved;
- the influence of the telecommunications industry is significant and negative, that means that *Intellectual value* of the companies of this industry was destroyed through the investigated period.

However it is necessary to mention that a kind of a paradox of the *Intellectual value* creation of the large companies of BRIC was revealed. The annual growth of the *Intellectual value* can be traced during the analysis of data which include a break of tendency of the year 2008, when the economy overheat has turned into slump. Simultaneously, the authors Bayburina, Golovko (2009) previously have shown that upon analyzing data of the upturn period 2002-2007, excluding the data of the year 2008, a destruction of *Intellectual value* of the large companies of BRIC was revealed. The analysis of the large companies of BRIC and *Intellectual value* can be regarded as the basis for the implementation of the tendencies indicator. This indicator can show whether the world economy is overheated or not. By means of this research in terms of the crisis it is possible to specify directions of the internal reserves audit to prevent the considerable *Intellectual value* decrease and to stipulate the corporate *growth*.

However, specified directions of the internal reserves audit and the discussion of the *Intellectual value* on the emerging markets is very close to the fact that large BRIC companies depend a lot on the specific features of the infrastructure of each developing country. India and Russia are countries with the industrial potential, which is not fully realized, e.g. a lot of Russian companies are underinvested with unbalanced development strategies. Decrepit and out-of-date production facilities, in turn capital expenditures are the matter of great importance. The capital expenditures together with the innovative managers and management techniques tend to be the leverage, which can push these companies towards intensive development, especially in Russia. The current economic downturn has reallocated the role of each country of the BRIC group. China and India can be considered as leaders due to the sustainable economic features towards crisis. In 2009 Chinese government has adopted \$600 bln plan to recover the national economy by the means of investments target infrastructural projects. The Chinese companies (with the governmental support) execute an aggressive expansion towards the foreign markets, mainly towards emerging markets: African countries, Venezuela, Russia and Australia, Turkmenistan (gaz contracts together with Russian companies), etc.

The economy of India is also marked out by some outstanding competitive advantages, such as the high level of consumer demand, innovativeness in comparison with other BRIC countries, e.g. industrial park in Keral, established in 1982, and the well-developed network of industrial parks. Unlike innovativeness of China and India mainly the raw materials export characterizes Russia and Brazil. Governmental investments, tax burden depend a lot on raw materials prices, in turn the business activity, the innovative path of development, the scope for investment depend a lot on the conjuncture of raw materials. Correspondingly close to the end of the economic downturn these BRIC countries can be regrouped and analyzed separately to investigate the *Intellectual value* and factors of the growth of large companies of the each particular emerging market, undoubtedly new research challenges may appear.

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