Analysis of social development in the Arctic countries

K N Kikkas

1 Peter the Great St. Petersburg Polytechnic University, Polytechnicheskaya, 29, 195251, St. Petersburg, Russian Federation
1E-mail corresponding author: kikks.90@yandex.ru

Abstract. The paper describes features of the development of the social sphere of the Arctic countries. Almost four million people live in the Arctic. The Arctic includes part of the territories of eight countries: Canada, Denmark, Finland, Iceland, Norway, Russia, Sweden and the United States of America. The Arctic is also home to dozens of indigenous groups. To develop strategies for the development of the Arctic territories, it is important to compare the features of the development of the social sphere of the Arctic countries. The paper provides a list of indicators evaluating the development of the social sphere. The methodology of a comparative analysis of the convergence or divergence of indicators of the social sphere of eight Arctic countries is described. An analysis of the existence of convergence / divergence of indicators of the social sphere is carried out. The analysis was carried out using three methods: σ – convergence; absolute β – convergence; conditional β – convergence. The results of the analysis are discussed.

Keywords: Arctic countries, social sphere, indicators of the social sphere, convergence / divergence.

1. Introduction

The social sphere consists in a combination of industries serving the basic social needs of the population, including education of children and adults, healthcare services, cultural and sports activities. The social sphere can be said to include everything that supports the life functions of a person outside of his or her primary, economically-productive activity [1].

Today, almost four million people live in the Arctic, with the exact number varying according to how the borders of the Arctic are determined. The population of the Arctic comprises indigenous peoples of the North, migrants, hunters and reindeer herders, as well as other rural residents and urban dwellers. Many of the indigenous peoples have their only residence in the Arctic, where they continue to engage in traditional crafts, while at the same time adapting to the conditions of the modern world. People have long been part of the Arctic, both influencing and being influenced by local and regional environments. Over the past few centuries, the influence of immigrants has led to a significant increase in pressure on the Arctic environment, in particular, through an increase in fish catches and slaughter of animals, as well as a growth in industrial development.

The Arctic includes part of the territories of eight states: Canada, Denmark, Finland, Iceland, Norway, Russia, Sweden and the United States of America. The Arctic is also home to dozens of indigenous peoples, each forming distinct subgroups and communities. While indigenous peoples currently make up about 10% of the total Arctic population, in Canada they make up about half of the total population of the Arctic part of the country and in Greenland they constitute a majority. The Arctic region’s economy is largely based on natural resources – from oil, gas and metal ore to fish,
deer, caribou, whale, seals and birds. In recent decades, a significant contribution to the economy of many local communities and regions of the Arctic has been achieved through the growth of tourism. The presence of state institutions, including the military, is also an important component of the economy in almost all areas of the Arctic, with the state providing the population with more than half of the available jobs in some areas [2].

The aim of this article is to analyse features of the development of the social sphere of the Arctic countries and assess the convergence / divergence of indicators of the social sphere using three methods: σ - convergence; absolute β – convergence; conditional β – convergence.

2. Methods
The convergence / divergence analysis was carried out using the tri-method: σ – convergence; absolute β – convergence; conditional β – convergence. Methodological principles of the analysis of various spheres of life are described in [3],[4],[5],[6].

σ – convergence. σ – convergence was estimated by the variance and the Theil index. σ – convergence is true if there is a decrease in the variance of the indicator for a group of countries over time. In other words, if $\sigma_{t+\Delta} < \sigma_t$, (where $\sigma_t$ - is the variance indicator), then the hypothesis is true. The coefficient of variation (CV) was used as an indicator of variance, since it does not depend on the unit of measure. CV is calculated for each year for the indicator in question using the following formula (1):

$$CV = \frac{S_{x_j}}{\bar{x}_j}$$

where $S_{x_j}$ - standard deviation of the indicator;

$\bar{x}_j$ - the average value of the indicator of the j-th country;

$N$ - Number of countries.

An increase in CV over time indicates an increase in inequality between countries. A decrease in CV indicates σ – convergence.

The Theil index is calculated for each year using the following formula (2):

$$T = \frac{1}{N} \sum_{j=1}^{N} \left[ \frac{x_j}{\bar{x}_j} \right] \ln \left( \frac{x_j}{\bar{x}_j} \right)$$

Equating the Theil index to zero means convergence, while equation to unity means complete divergence.

Absolute β – convergence. The hypothesis of testing absolute β – convergence implies a negative statistical relationship between the rate of growth of the indicator and its initial level. In this case, the paired regression dependence of the growth rate of the indicator and initial level of this indicator is estimated.

The coefficients of the regression equation are found from the equation (3).

$$\log \frac{X_t}{X_{t-1}} \times 100 = \beta_0 + \beta_1 \log x_0$$

where $X_t$ – is the value of the indicator in the t-th interval;

$x_{t-1}$ – indicator value in the t-1 interval;


\( t_0 \) – the initial period of time;

\( x_{t_0} \) – the value of the indicator during the initial period of time.

\[ \log \left( \frac{\prod_{i=0}^{T} x_i}{x_{t-1}} \right) \times 100 \] – is the logarithm of the indicator growth rate (geometric mean annual growth rate for the period from \( t_0 \) to \( t_T \)).

**Conditional \( \beta \) – convergence.** When verifying conditional convergence, the influence of certain conditions (variables) is considered, for example, consumption, foreign direct investment and others. The hypothesis assumes that in the regression equation, the sign at the initial value of the indicator should be negative, while the sign at the controlling variable should be positive if the selected conditions contribute to improvement i.e. a faster growth rate. Here, the choice of influencing conditions (controlled variables) is significant. The following conditions were selected as influencing conditions: FDI, population growth, education spending, household consumption.

The coefficients of the regression equation are found from the equation (4).

\[ \log \left( \frac{\prod_{i=0}^{T} x_i}{x_{t-1}} \right) \times 100 = \beta_0 + \beta_1 \log x_{t_0} + \beta_2 \log y_{t_0} + \beta_3 \log z_{t_0} + \beta_4 \log \phi_{t_0} \]

(4)

where

\( x_i \) – is the value of the indicator in the \( t \)-th period;

\( x_{t-1} \) – indicator value in the \( t-1 \) period;

\( t_0 \) – the initial period of time;

\( x_{t_0} \) – the value of the indicator during the initial period of time;

\( y_{t_0} \) – the average value of FDI for the period;

\( z_{t_0} \) – the average value of population growth over the period;

\( \phi_{t_0} \) – the average value of government spending on education for the period.

### 3. Results

#### 3.1. Characteristic features of the social sphere of the Arctic countries

Some features of the social sphere of each Arctic country are described below [7],[8],[9],[10],[11],[12],[13],[14],[15].

Canada. In terms of land area, this North American state ranks second only to Russia. The budget of Canada is distributed such that the residents themselves obtain the maximum benefit from this money. The per-capita costs of maintaining the apparatus and other needs of the state are several times lower here than in other countries. Due to Canada having a small army and tending not to spend taxpayers’ money on keeping afloat loss-making enterprises, the strength of the state apparatus is so small that it costs Canadians much less than its Arctic neighbours. The state guarantees a certain standard of living to any person, whether they are a Canadian citizen, a permanent resident of the country or a refugee.

Compulsory education has been introduced in Canada for children aged from 6 to 14-16 years old (depending on the province). Most Canadian public schools are secular; however, in Quebec, they are Catholic.
Canadian healthcare is one of the social domains of which the state can be justifiably proud. The publicly-funded Canadian health care system is best described as a system of insurance and health plans covering ten provinces and three territories.

Single mothers can be provided with housing that is 80% paid by the state. Unemployment benefits are paid only to those who either have already had a permanent job and contributed to the appropriate fund or to those who work less than 15 hours a week and/or earn less than 113 Canadian dollars per week. Elderly people can receive a variety of benefits designed to maintain a secure old age.

Denmark. This northwestern European state, located on the Jutland peninsula, is the smallest and most southerly of the Scandinavian countries. The extensive Danish social security system, which is financed by a large proportion of government spending, covers the entire population of the country. As a rule, social benefits and medical services are provided to Danish citizens free of charge, while the associated expenses are covered by taxes.

Cash benefits are issued at the place of residence of the recipient, who does not have to be a Danish citizen. However, as of July 1, 2002, a recipient who does not have Danish citizenship must have resided in Denmark for seven years. Only citizens whose social status has significantly worsened (e.g. as a result of unemployment, illness or divorce) can expect to receive cash benefits.

Assistance to families with children and adolescents is usually provided in the form of social services. Denmark is one of the foremost nations in the world in terms of the number of working women. However, child-care facilities are provided on a fee-paying basis. During maternity/paternity leave, both parents are entitled to unemployment benefits.

One of the main goals of social assistance for elderly and disabled people is to give them the opportunity to be at home rather than relocating them to a residential care facility or nursing home. Such people are provided with support in carrying out household tasks and observing personal hygiene including the hire of necessary household equipment.

The old-age pension system is run by the state. The Danish retirement age is 65 years.

According to a recent study by the Gallup Institute, Denmark has the highest level of satisfaction with life in the world – 72% – followed by Sweden and Canada with 65% each. Denmark has among the highest salary and pension levels in Europe. In terms of hourly wages, Danes are EU leaders, receiving around 37.6 euros per hour on average; that is, somewhere around 30% more than in other EU countries. Unemployment benefits make up 90% of previous income and can be paid for up to four years.

Pensioners can receive big discounts, for example, in theatres, cinema and more. Education in public schools is free: every student, regardless of how he or she studies, receives a scholarship. Healthcare is for the most part free at the point of need. Moreover, many goods that help to make people healthier – fruits, vegetables, medicines, sports – are subsidised by the state and thus sold cheaper. Regarding utility bills, Danes pay only for electricity and heating, while potable tap water is supplied free of charge. As a consequence of such a social model, there is a high degree of income redistribution; in order words, Danes are subject to a high taxation rate. This explains why in Denmark nobody is either fabulously rich or starving to death. Direct and indirect taxes take away an average of 52% of the income of a Danish family. By the same token, the minimum income tax here is 38%.

Finland. The application of Finnish knowledge and modern technologies to Arctic areas including construction, environmental protection, infrastructural development and transportation (including ice shipping) is also reflected in the development of the social sphere.

According to the ratings of the international organisation Save the Children, Finland was the best country in the world for mothers and children in 2013 and 2014. Since 2010, healthcare has been virtually free for residents of the country.

Finland has a law that categorically prohibits the sale of tobacco products to people under the age of 18. It is also forbidden to purchase tobacco products online.

By law, Finland has universal compulsory education; however, school attendance is not mandatory and about 200 children are home-educated.

Unemployment accounts for about 9% of the country’s overall population (8.7% among Finns; 28% among Russian speakers; the majority of unemployed people in Finland consist of immigrants from Somalia, Iraq and Afghanistan – among whom the unemployment rate is higher than 50%).
According to the Statistical Committee, income disparity between Finnish citizens began to increase sharply during the mid-1990s, reaching a peak in 2007. In 2013, the incomes of the richest fell by 5.9% due to a decrease in profits from sales and dividends, while the incomes of the poorest increased by 2.6% due to indexation of social benefits and tax cuts.

Iceland. Like the other Scandinavian countries such as Sweden and Norway, Iceland is often described as a welfare state. In such a society, the state takes responsibility for the welfare of citizens, which cannot be assigned either to the individual him- or herself or to a private corporation or local authority. The state provides benefits and addresses social security problems, especially in the areas of healthcare, education, housing, income support through unemployment benefits, benefits for low-income families, cash payments to low-paid workers, general material assistance, etc. These expenses are financed by state insurance programmes and a taxation system that reduces social inequality through redistribution of resources.

There is practically no poverty in the country and class stratification is less pronounced than in many other countries. Increased prosperity was accompanied by increased economic and social security and equality. The average age of the population is 34 years, while average life expectancy is 79.8 years. Following independence from Denmark in 1944, the economy of Iceland was significantly strengthened and the living standards of the population increased. In this regard, Iceland pulled ahead of other Scandinavian countries becoming one of the per-capita wealthiest countries in the world.

The labour resources in Iceland (as in all countries of Northern Europe) are traditionally of high quality, i.e. a high level of education and vocational training. Accordingly, the cost of labour in Scandinavian countries is generally quite high. Iceland is a state in which social programmes are widespread. In large cities, there are health centres that provide maternal and child health care, vaccinations, etc.

Much attention is paid to healthcare. The indicators of public state healthcare include long life expectancy (76 years for men and 81 years for women) and very low child mortality.

Thanks to a long literary tradition, a high standard of education and the considerable interest of the entire population of the country in books and reading, Iceland is characterised by a high level of cultural development. Education in public schools is compulsory and free for all children aged between 6 and 15 years. High-school graduates are entitled to continue their studies at a college or vocational school. Universities offer higher education qualifications in economics and management, in the humanities – e.g. philology, history and philosophy – while the natural and social sciences are studied in polytechnics. Education in technical colleges is mostly free.

Norway. This state occupies the western and northern parts of the Scandinavian Peninsula, the Svalbard archipelago (including Bear Island) in the Arctic Ocean and Jan Mayen Island in the northern Atlantic Ocean.

Norwegian families tend to be limited to one or two children, with few families having more than three children. It is common for young Norwegians to live at their parents’ homes until graduation, after which point they leave home to live alone or with friends. The reason for this may be due to difficulties in finding sufficiently well-remunerated employment to pay for their own housing.

In Norway, schooling is compulsory; that is, all seven-year-old children who enter the first grade, must complete a nine-year school education. Norwegian healthcare facilities are for the most part owned and run by the state; however, some institutions are owned and operated by private individuals, companies or organisations. The state insurance system provides universal cover for all Norwegian residents, ensuring that everyone is provided with a reasonable degree of economic security when they grow old, get sick, become disabled, unemployed or lose their breadwinner.

Russia: The Russian Arctic comprises a vast territory. The effective and safe development of the Arctic is one of Russia’s main national priorities [16], [17], [18].

A pressing issue facing the Russian economy during the twentieth century was the development of the social sphere. Various economic and political transformations in Russia since the beginning of the 1990s have brought the problem of the development of the social sphere to the forefront of
governmental thinking. First and foremost, this consideration applies to the most prominent social sectors, such as education, healthcare, housing and communal services, as well as culture.

Sweden. The country has a significant state-controlled social sector, comprising social security, healthcare and education. All of this requires large budgetary costs; consequently, taxation, including social security contributions, is quite high in Sweden constituting around 60% of GDP. Until recently, healthcare and education were completely free of charge. While education, including higher education, continues to be cost-free, healthcare became partially commercialised. The availability of raw materials (timber, iron ore, hydropower) combined with skilled workers and innovative talents helped Sweden to reach the level of the UK in terms of per capita income by the beginning of the 1940s.

Average Swedish life expectancy – currently 78 years for men and 81 years for women – is still tending to increase.

Sweden has long been known not only for its high-quality education, but also for the fact that education at each level is free, due to educational institutions being fully or partially financed from the state budget. Thanks to its excellent reputation in the world market, colleges and universities in Sweden attract more and more foreign students every year.

United States of America. The USA became an Arctic power with the acquisition of Alaska from Russia in 1867.

The modern education system in the USA contains state (prevailing in primary and secondary education) and private (mainly in higher education) sectors. In most states, compulsory education is required for people between the ages of 6 and 16. In some states, education is compulsory until 18. The duration of secondary education is 13 years (one of the longest in the world). More than 83% of Americans aged 25 years and older have completed secondary education, while 25% have completed higher education (including 7% with scientific degrees). Universities are present in every state of the country.

The healthcare system in the United States of America has a leading position in the world in terms of the scale of resources concentrated in it. Over 10 million people are employed in the industry. In terms of medical expenses, the USA ranks first in the world – both in absolute figures (2.26 trillion US dollars or 7439 US dollars per person), as well as in terms of percentage of GDP (16%).

Healthcare in the USA is supported by the most advanced medical equipment, medicines and other supplies. Today, most of the Nobel Prizes in the field of medicine are received by representatives of the United States – 18 of the last 25 laureates were American citizens or invited scientists. American scientists account for half of all new medicines created over the past 20 years. In terms of income, American doctors are far superior to their colleagues working in other countries.

In the United States, both public and private pension systems are in operation. As a consequence of this, Americans can secure for themselves not one, but three pensions: state, private collective at the place of work and private individual by opening a personal retirement account.

3.2. Indicators of the social sphere
The development of the social sphere must be evaluated by a certain system of indicators reflecting processes occurring in the social sphere, referred to here as social indicators. In the present work, in order to encapsulate the principal processes occurring in the social sphere, it is proposed to use the following indicators [19],[20],[21],[22],[23],[24],[25],[26]: unemployment (% of the total labour force); electricity consumption (kWh. per person); household consumption (US $ per person); gross expenditures (US $); birth rate (per 1000 people); government spending on education (% of total spending); the number of hospital beds (units per 1000 people); the number of permanent subscriptions to a telephone service (units per 100 people); the number of Internet users per 100 people; the Human Development Index (HDI).

Statistical data were collected for the Arctic countries reflecting the dynamics of the period from 1996 to 2018. The following databases were used: the official website of the Ministry of Economy and Trade of the Russian Federation http://www.economy.gov.ru/wps/portal; the official website of the Arctic Council arctic-council.org; The official portal of Denmark www.denmark.dk; the official website of the Norwegian government http://www.regjeringen.no/en.html?id=4; the Yukon
4. Discussion

The results of the convergence / divergence test are evidentiated on the example of individual indicators. Analysing the HDI indicator, we can infer that there is an increase in both the minimum and maximum values of this indicator. With a sample of only 8 countries, it is difficult to judge whether there is convergence or divergence on this indicator. However, by analysing the initial data in more detail, it can be concluded that the minimum value of this indicator is found in Russia, both in 1996 and 2018. Nevertheless, given that in a sample of 8 countries, 7 represent the top 50 countries in the world by this indicator, growth may indicate convergence. By analysing the birth rate and the number of hospital beds per 1000 people, we can infer the presence of convergence occurring in the Arctic countries on the basis of a decrease in these indicators. Analysing changes in the indicator of electricity consumption per person, a significant jump in the maximum value of this indicator can be seen to take place by 2018. After analysing the data in more detail, it was revealed that such high electricity consumption is intrinsic to Iceland. However, such a great significance can be explained by the fact that the population of Iceland is only 320 thousand. Nevertheless, contemporary Iceland has one of the highest amounts of electricity generated per capita.

Next, we present the results of calculations of the coefficient of variation in dynamics. For greater clarity and ease of analysis, the results are presented in the form of a graph. Thus, figure 1 shows the dynamics of the coefficient of variation for the indicator of electricity consumption per capita, while figure 2 shows the dynamics of the Theil index for the indicator “electricity consumption per person”
Thus, from the above graphs it can be seen that CV grows with time (Figure 1). In addition, the trend line indicates a lack of convergence between the Arctic countries in terms of electricity consumption per capita. According to the analysis technique, a Theil index value close to zero implies the presence of convergence. However, in this case, it is difficult to draw a conclusion on this basis (Figure 2). Given the presence of an increase in the index, it is not possible to confirm the presence of convergence, but at the same time it is also impossible to exclude it, since convergence may be present, but not between all the Arctic Council countries.

Further, figure 3 shows the dynamics of CV for the birth rate indicator, while figure 4 shows the dynamics of the Theil index for the birth rate indicator.
According to the graphs above, the decrease in CV (Figure 3), and Theil index close to zero (Figure 4) for the “fertility” indicator, indicates the presence of sigma convergence between the Arctic Council countries. Thus, our assumption, based on a change in the maximum and minimum values of this indicator among the countries in the sample, was confirmed.

**Absolute $\beta$ – convergence.** Verification of absolute $\beta$-convergence by HDI for the Arctic countries. We assume that countries converge in terms of their development.

We obtain the following equation: 

$$Y = 1.448 - 0.003\times X_{t_0}.$$  

Since there is a “-” sign with the coefficient $\beta$, convergence is present between the countries in the selected population in terms of HDI for the period 1996-2018. Our hypothesis is thus confirmed.

**Conditional $\beta$ – convergence.** The hypothesis assumes that in the regression equation, the sign at the initial value of the indicator should be negative, while the sign at the controlling variable should be positive if the selected conditions contribute to improvement i.e. a faster growth rate. The following conditions were selected as influencing conditions: FDI, population growth, education spending and household consumption.

Verification of conditional $\beta$-convergence by HDI for the Arctic countries. We assume that countries converge in terms of their development.

Since in this case the regression analysis only takes a small sample of countries into account, a significance level of 5% was selected. In order to check the significance of each regression coefficient, t statistics are calculated. An appropriate significance level or error probability is used to measure the probability of an accidental occurrence in a sample of t-values equal to or greater than a given value. Verifying the significance of the regression coefficients is important because, in contrast to correlation coefficients, they do not have maximum and minimum values, but instead their values depend on the units of measurement of the corresponding features. This means that the value of the regression coefficient alone is not sufficient to determine the influence of the factor on the result. In this case, all the obtained coefficients are significant. Thus, we obtain the following equation:

$$Y = 1.445 - 0.0002\times X_{t_0} + 0.0004\times Y_{t_0} + 0.0008\times Z_{t_0} + 0.0003\times \varphi_{t_0}.$$  

Our hypothesis assumes that in the regression equation, the sign at the initial value of the indicator should be negative, while the sign at the controlling variable should be positive if the selected conditions contribute to improvement i.e. a faster growth rate.
Since the sign at the initial values of the indicator is positive, it means that there is convergence between the respective countries. A negative sign in front of the control variable indicates that this condition contributes to an improvement, that is, a faster growth of the indicator. Thus, our hypothesis is confirmed for the countries of the Arctic Council. The aim of the present work was to assess the convergence / divergence of indicators of the development of social processes in the Arctic countries.

5. Conclusion
The study examined the social spheres of eight countries – Canada, Denmark, Finland, Iceland, Norway, Russia, Sweden and the United States of America. A number of key areas of social development, such as education, demographic environment and healthcare, were identified.

In order to assess the convergence / divergence of processes in the social environment, we also identified a number of indicators that describe a particular social environment. In our opinion, the most interesting indicators for analysis are those of birth rate, availability of hospital beds and level of government spending on education. In addition, such important indicators as household consumption, Internet access and telecommunications were examined. Particular attention was paid to the Human Development Index (HDI), since it was on this basis that the analysis of convergence / divergence of the social processes of the Arctic countries was based. In the course of the study, we proposed a hypothesis concerning the convergence of processes occurring in the social environment of countries. Based on the methodology for detecting the presence of convergence, we conducted a series of tests and analyses that confirmed this hypothesis. Thus, the analysis of sigma convergence showed that among the countries of the sample there is convergence in such indicators as electricity consumption, fertility, as well as access to the Internet and telecommunications. These conclusions are based on the results of calculations of the coefficient of variation, as well as the Theil index.

Verification of absolute $\beta$-convergence by HDI Based on the calculations, a regression model of the negative statistical relationship between the growth rate of the HDI indicator and its initial level was constructed, confirming the hypothesis that there is a process of convergence of the social processes of countries estimated by the HDI indicator. Verification of conditional $\beta$ – convergence was also carried out for the HDI indicator. In this analysis, in addition to the indicators listed above, we used the indicators of FDI (foreign direct investment) and average population growth. The analysis of conditional convergence is based on the hypothesis that in the regression equation, the sign at the initial value of the indicator should be negative, while the sign at the controlling variable should be positive if the selected conditions contribute to improvement i.e. a faster growth rate. Thus, in the course of calculations, we obtained a regression equation confirming the convergence between the Arctic countries in the processes taking place in the social environment.

References
[1] Galligan D J 2010 Law in modern society (New York: Oxford University Press)
[2] Froukje M P 2019 Dimensions of transboundary legal coherence needed to foster ecosystem-based governance in the Arctic Marine Policy 103666
[3] Didenko N I, Skripnuk D F, Kikkas K N, Romashkin G and Kulik S V 2018 The analysis of Convergence - Divergence in the development of innovative and technological processes in the countries of the Arctic Council Int. Conf. on Information Networking pp 626-631
[4] Didenko N, Kulik S, Skripnuk D and Samylovskaya E A 2018 Country competitiveness analysis. Adl-model involved Int. Multidisciplinary Scientific GeoConf. Surveying Geology and Mining Ecology Management 18(5.3) pp 3-10
[5] Klochkov Y, Klochkova E, Kiyatkina E, Skripnuk D and Aydarov D 2018 Development of methods for business modeling Int. Conf. on Infocom Technologies and Unmanned Systems: Trends and Future Directions pp 366-369
[6] Popkova A, Kostko N and Skripnuk D 2017 The quality of social space mapping: The case of Tyumen, Russia Int. Multidisciplinary Scientific GeoConf. Surveying Geology and Mining Ecology Management 17(23) pp 753-760
[7] Cáceres D V G 2018 European cooperation: How important country is Poland to ensure the Arctic governance? Polar Science 35 L74
[8] Wilson D M 2008 Dying and Death in Canada (Toronto: University of Toronto Press) p 25
[9] Bailey G A 2008 Indians in Contemporary Society. Handbook of North American Indians (Washington, DC: Smithsonian Institution) chapter 2 p 285
[10] Inuit Cite IPCC Results as Further Proof of Human Impacts Contributing to Climate Change: Inuit Call on Canada to Recognize Arctic in Foreign Policy and Commit Resources Towards Adaptation 2007 chapter 11 Available from: https://www.inuitcircumpolar.com [Accessed 10 August 2019]
[11] Icelandic Network of Arctic Research and Projects database launched 2015 Icelandic Arctic Cooperation Network (Electronic Materials vol 1) Available from: https://www.uarctic.org/news/2015/4/icelandic-network-of-arctic-research-and-projects-databank-launched [Accessed 10 August 2019]
[12] Thematic Network on Health and Well-being in the Arctic 2019 Thematic Networks and Institutes (Electronic Materials) Available from: https://www.uarctic.org/organization/thematic-networks/health-and-well-being-in-the-arctic [Accessed 12 August 2019]
[13] Bannier C E, Thomas Heyden T and Tillmann P 2019 Rating changes and portfolio flows to emerging markets: Evidence from active and passive funds Economics Letters 178 pp 37-45
[14] Curtin J, McNerney C, Gallachóir B Ó, Hickey C and Deeney P 2019 Quantifying stranding risk for fossil fuel assets and implications for renewable energy investment: A review of the literature Renewable and Sustainable Energy Reviews 116 109402
[15] Allen J, Nataraj S and Schipper T C 2018 Strict duality and overlapping productivity distributions between formal and informal firms J. of Development Econ. 135 pp 534-554
[16] Didenko N and Kunze K 2014 Relationship between Energy Policies and Quality of Life in Russia WIT Transactions on Ecology and the Environment 186 pp 3-11
[17] Didenko N, Kunze K and Skripnuk D 2015 Russian Export Strategy and Social Sector: Consequences of Resource-Oriented Exports on Population of Russia Mediterranean J. of Social Sciences 6 (552) pp 473-481
[18] Didenko N and Skripnuk D 2014 The impact of energy resources on social development in Russia WIT Transactions on Ecology and the Environment 190 (1) pp 151-159
[19] Pogodaeva T V, Zhaparova D V, Rudenko D Y and Skripnuk D F 2015 Innovations and socio-economic development: Problems of the natural resources intensive Use regions Mediterranean J. of Social Sciences 6(1) pp 129-135
[20] Rudenko D and Skripnuk D 2016 Environmental Kuznets curve: The case of arctic Russian regions Int. Multidisciplinary Scientific GeoConf. Surveying Geology and Mining Ecology Management 3 pp 209-216
[21] Didenko N, Skripnuk D, Mirolyubova O and Radion M 2017 Analysis of rural areas development of the region using the ADL-model Research for Rural Development 2 pp 142-147
[22] Skripnuk D, Kikkas K and Romashkina E 2019 Sustainable development and environmental security in the countries of the circumpolar north E3S Web of Conf. 110 02037
[23] Kikkas K N, Kulik S V, Krepkaia T N and Mokhorov D A 2019 Analysis of the economic relations of the circumpolar countries IOP Conf. Series: Earth and Environmental Science 302(1) 012093
[24] Silkina G 2019 From analogue to digital tools of business control: Succession and transformation IOP Conf. Series: Materials Science and Engineering 497(1) 012018
[25] Stark O, Zawojksa E, Kohler W and Szczygietski K 2018 An adverse social welfare effect of a doubly gainful trade J. of Development Econ. 135 pp 77-84
[26] Frederiksen T 2018 Corporate social responsibility, risk and development in the mining industry
    *Resources Policy* **59** pp 495-505