A sustainable consumers’ consumption in the context of Arctic circular economy

S V Karpova¹, V I Cherenkov²* and N I Cherenkova³

¹ Department of Logistics and Marketing, Financial University under the Government of the Russian Federation, Moscow, 191023, Russia
² Graduate School of Management, St. Petersburg State University, St. Petersburg, 199004, Russia
³ English Department, St. Petersburg State University of Economics, Russia, St. Petersburg, 190005

*Corresponding author’s e-mail: cherenkov@gsom.pu.ru

Abstract. The concept of circular economy has factually become a cornerstone for describing a necessary redesign of a hypothetic Arctic industrial eco-system or geosocioeconomic (GSE) system to get to a better sustainability. Given the quarter-century-old post-Soviet hibernation of Russian Arctic politics, the authors have largely focused their research on an analysis of relevant foreign sources. These sources were grouped by the following topics: (1) a model of the circular economy as the most suitable for such a remote and vulnerable region as the Arctic; (2) modifying the model of consumers’ consumption taking into account the main principles of circular economy; and (3) creating a mental sustainability construct in the mind of sustainability stakeholders with emphasis on current and future students. Despite the fact that consumers’ consumption holds a prominent role on the way toward the sustainable development of Arctic regions the said role is not well accounted for in the literature on circular economy. This paper contains the appeal to continue studying thoroughly the relationship between consumers' consumption and building a circular economy in the light of implementing the concept of sustainable development, which is especially important for the Arctic. The paper is supplied with graphic materials that could have a didactic value.

Key words: Arctic environment, circular economy, consumer behaviour, consumers’ consumption, sustainability construct, sustainability literacy, sustainable consumption and production, sustainable development

1. Introduction

The concept of "sustainable development" sounds like a guideline for a "common happy future" for all of humanity and corresponding term is one of the leaders in popularity on the Internet (there are more than 81 mln. responses for this term in Google at October 2019 that shows a bit more than 50% growth in comparison with August 2018). On part of the way to this promised universal happiness for everyone – from 1987 to 2002 and further to 2016 (table 1) – there were rather distinct semantic changes in the definitions formulated for the term sustainable development. Comparing these definitions one could find (table 01) that there is a real transfer from a naked declaration of an abstract and eternal “global good”
without any reference to its dimensions (1987) to a balance between goals of social and economic development provided a preservation of environment on a global scale (2016). The changes in contents of the said definitions show a transition from a fuzzy appeal to live in full harmony – between business, people, and nature - to formulating specific ways of research, monitoring and actions to achieve the said harmony. There were many problems to be resolved on the way from theoretical designing the sustainable development concept to trials of its implementation in real socio-economical life of nations of different levels of development. It is the differences in the levels of development of countries and, consequently, in the standard of living of their population that led to the appearance of the formula “inclusive and sustainable development” as the SDG 8 [1]. This collocation is also very popular (more than 2 mln. Google responses at October 2019) because it concerns the ways of future development. This modification is important for the sustainable development of the Arctic, as this development should not suppress the indigenous peoples of this huge region. And this should not be a game of terms within the framework of political demagoguery. According this reason, people from less developed countries insistently state something like the following [2]: “For sustainable development to be realized, then development which is both inclusive and sustainable – synergetic between the acts of people and natural conditions – is needed”. The same viewpoint dominates at the UN level [3, p.3]: “Goal 8 of the 2030 Agenda for Sustainable Development seeks to promote sustained, inclusive and sustainable growth, full and productive employment, and decent work for all”. Finally, the mainstream of the present paper is defined by the SDG 12 “Responsible consumption and production” [1]. Anybody can read therein “Sustainable consumption and production is about promoting resource and energy efficiency, sustainable infrastructure, and providing access to basic services, green and decent jobs and a better quality of life for all.”

Table 1. The semantic evolution in the term “sustainable development” and the emergence of the term “inclusive and sustainable development”

| Year   | Definition                                                                                                                     |
|--------|---------------------------------------------------------------------------------------------------------------------------------|
| 1987 [4] | Development that meets needs of the present without compromising the ability of future generations to meet their own needs. |
| 2002 [5] | Development that is built on three interdependent pillars which must be established at local, national, regional and global levels. |
| 2017 [6] | Development that is a perpetual process of balanced socioeconomic development harmonious with the global environment. |
| 2019 [1] | Promote inclusive and sustainable economic growth, employment and decent work for all.                                          |

A literature review concerning items of sustainable development literature [7-11] shows that there is a common understanding of the impending catastrophe caused by a long-term, one might say, predatory attitude to natural resources. There is also more or less similar call for measures, solutions and programs to get to the SDGs. However, contrary to extensive and intensive promoting the ideas of inclusive and sustainable development there are many barriers and obstacles combating SDGs implementation. At first sight, the system of exchanges inside the “ideal” socio-geo-economic system or SGE-system, composed from three mega-domains – (Profit – People – Planet) in terms of J. Elkington [12] should be rather well-balanced. But metaphorically speaking, the system of exchanges inside the socio-geo-economic system reminds the scenario from the Old Russian fable “Swan, Crayfish and Pike”. These fable heroes were assigned to transport the same wagon together, but each pulled this wagon to its own environment: air, land and river, respectively. Conflict of interest between the said three mega-domains reminds the fable situation has been projected onto the space of four
basic types of capital: human, social, built, and natural. According to Pareto principle it is impossible to improve the socio-economic condition of one mega-domain without worsening the condition of one or more mega-domains in the same closed SGE-system [13].

The Arctic as a whole is considered as a mega-region very important for a future Earth civilization existence but having a high level of multidimensional vulnerability [14]. First of all, many documents and academic articles widespread threatening evidence of climate change and other Arctic vulnerabilities, with implications for human and biophysical systems [15, 16] as well as anthropogenic logistics systems [17]. The framing of our research is focused on the sustainable consumers’ consumption in the hypothetic Arctic circular economy (figure 3). Therefore, the principles of arranging a circular economy [18] are considered here in connection with the achievement of sustainable development goals related to human being life as a living creature but not as production system drivers (table 2). Application of circular economy principles encompass different approaches such as dematerialization, increased productivity, 5R principles (Reducing, Reusing, Recycling, Refurbishment, Remanufacturing,) and consumer product life cycle extension.

**Table 2. Arctic consumers’ consumption model in the light of circular economy principles**

| Circular economy principles                                      | Features of a model of sustainable consumers’ consumption                                                                 |
|------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| Waste and by-products must systematically be valorised:          | Creating Arctic symbiotic eco-industrial networks: smart networks of resources and waste in which the residues of one network nod can become the inputs of another nod. |
| Loss caused by dispersion must be minimized:                    | Products and services delivered to and/or created in Arctic eco-industrial networks must be designed to minimize spreading of its harmful effects on the environment and the health or better eliminate them. |
| The economy should be localized and dematerialized as much as possible: | The goal is to minimize the total inbound material flows in Arctic eco-industrial networks due to innovations that could permit arrange: (1) eco-industrial networks similar to the natural food web; (2) voluntary limiting human overconsumption; (3) wider implementing the 3R principles; (4) digitizing inner logistics; (5) using special Arctic R&D; etc. |
| Energy must rely less on fossil hydrocarbon:                    | The use of various types of fossil fuels (coal, oil and natural gas) in the Arctic can hardly be replaced on a large scale by alternative (renewable) energy sources. However, experiments with mobile nuclear power plants (Russia) and electricity generation using power of stable underwater currents (Japan) took place. In addition, the implementation of digitized energy distribution and control systems might be able to help. |

a according to notions “industrial ecology” and “industrial metabolism” by Erkman [18] with authors’ corrections and contributions
b any innovations permitting to minimize inbound and reverse logistics flows in Arctic as well as extend the product life cycle and recycle waste/garbage are desirable [19]

It should be noted that in most cases, scientists addressing the problems of sustainable consumption and production turn to analogies and concepts drawn from natural ecosystems that reminds the production/consumption dialectic (figure 1) known as the core of the consumer culture theory (CCT) [20]. For example, the concept of industrial metabolism [21] is applied to optimizing the total industrial materials cycle: raw materials ⇒ semi-finished products ⇒ finished products ⇒ ultimate disposal of wastes or recycling them (figure 3). This transposition of the nature principles reminds the structure of a closed food chain. In this case, the GSE-system is perceived as a sort of huge and well-ramified circular food chain or network, in which every actor (of production, distribution or consumption) both dominates and is dominated by another. In the present case of Arctic region, the GSE-system’s “food chain” (due to its extreme remoteness) amplifies not just costs, but also the
vagaries and vulnerabilities of the consumption and production system. Therefore, the mainstream of the present research has been defined as searching for main features of a sustainable consumers’ consumption under conditions of the hypothetic Arctic circular economy.

Taking into account the unique Soviet history of supply chains (so-called “Severny zavoz” – “Northern delivery” using the North Sea Route and the great Siberian Rivers – Ob, Yenisei and Lena [22]) that was arranged to deliver basic consumer goods only (where consumers were practically not involved into defining an assortment of corresponding items) for people working in the Russian Arctic, the main goal of the present paper is defined as understanding new requirements that have to be applied to a contemporary consumers’ consumption pattern based on the sense and scope of following sustainable development goals – SDG 8 and SDG 12. Besides, the importance of a so-called mental sustainability construct to be built in the mind of sustainability stakeholders should be highlighted as a very important condition for implementing the sustainable development concept in the Arctic. A graphical representation of some concepts of the present paper is used to visualize them and offer this representation for possible applications in academic purposes.

![Graphical representation of some concepts](image)

Figure 1 Toward designing the sustainable value network (the relationships in the system "production - logistics - consumption" are not shown, but are displayed below)

- *Manufacturing + Retail + Use + Disposal & Recycling + Material extraction
- b* Material processing + R&D + Disposal & Recycling + Use + Logistics + Marketing
- cSustainable Consumption

Source: designed by authors on the basis of the concept of the sustainable value network [19]

2. Methods
The current research was conducted by reviewing secondary data from relevant academic journals, textbook chapters, official reports and some blogs critically considered and selected by the authors. Beginning from January 2017, the authors – using Google and Yandex searching machines in English and Russian speaking spaces, respectively – were identifying the publications related mainly to the key words of the present paper and their logically relevant combinations. The Boolean combination of the words (or colocations) have been selected to analyze the state of the Art and perspectives of further development of the subject of research defined by the title of the present paper was (“sustainable development” OR “sustainable and inclusive development” OR “sustainability” OR “sustainable production” OR “sustainable consumption”) AND (“consumer behavior” OR “consumers’ consumption”)

4
OR “consumer’s consumption” OR “consumption factors” “sustainable consumption model” OR “model of sustainable consumption”) AND (“circular economy”) AND (“food chain”) AND (“Arctic zone” OR “Arctic environment” OR “Arctic vulnerability”) AND (“sustainability literacy”).

This broad search strategy was designed in line with the objective of the paper to create an overview of existing vision of the role and place of sustainable consumers’ consumption in the frame of a hypothetic Arctic circular economy. Willing to receive a “fresh flow” of concepts our literature review was not limited by peer-reviewed Scopus/WoS indexed sources only but has included so-called “grey literature” that could be seen in References. The final output of interpreting the said literature review is presented herein in the form of “research roadmap” (figure 1) which the authors intend to use in their further work.

![Research Roadmap](image)

**Figure** 2 Roadmap for present and future research on changing a sustainable consumers’ consumption

**Source**: designed by authors

Our searching for relevant information sources in Russian part of the Internet (with the help of Yandex) was further declined due to a substantial ambiguity in the Russian terminology paradigm [23, 24] not thoroughly enough formed from a quantum of “imported knowledge” (mainly in English). It should be noted that the other Boolean combination (“circular economy” AND “consumers’
consumption” AND “Arctic”) gave only 63 Google-responses (October 2019), which after checking showed only a lack of or a weak indirect relationship to the mainstream of this article. We suppose that this indicates the novelty of the topic of our research, which should be continued.

3. Results and Discussion

Reviewing the relevant literature and consequent interpretation of the concepts and data discovered therein have shown that an achievement the SDGs in Arctic could be effectuated with the help of the following: (1) step-by-step arranging the perspective sustainable Arctic GSE-system on principles of circular economy (table 2) which should modify significantly the traditional model of consumer behavior (by Kotler-Keller) [25, p. 184] especially due to digitizing the said system; (2) understanding that in the variety of factors influencing consumer behavior (figure 4) and B2C consumption patterns, the culture of consumers and corresponding models of their motivation and behavior are of key importance [26] because contemporary consumers are now far from the former primitive model of *homo economicus* and the most part of them is represented by web-citizens dependent on opinions of the web-communities they belong to; (3) digitizing the Arctic space and creating socio-cyber-physical systems and intellectual space the Arctic zone [27] that is perhaps the most powerful factor modifying consumers’ consumption patterns; (4) wider implementing Arctic-oriented technological and social innovations that should be the basement for sustainable consumption and production [28]; and (5) creating the mental construct of sustainability [29] for all stakeholders of further Arctic exploration that should be done with special attention among representatives of new generation; (6) developing education for sustainability [30] from secondary to higher school (where the “first violin role” belongs to marketing [31] as the science of universal exchanges) to get to the necessary level of sustainability literacy [32]; and (7) continuing and expanding research concentrated on items of sustainable consumers’ consumption in international cooperation to get to a scientific cross-fertilization.

![Diagram](https://via.placeholder.com/150)

**Figure** 3 Product life cycle under impact of the superposition comprised from circular economy politics and consumers’ needs, wants and expectations presenting a consumption culture (the latter need to be formatted according to the sustainable consumers’ consumption pattern)

**Source:** designed by authors

One of the possible solutions for creating conditions of sustainable consumers’ consumption can
be presented with the help of a business idea for growing certain types of herbal spices and vegetables in areas of the Arctic zone [33] (this case is taken because the climatic features of the Arctic seem to be similar to those that are in the Antarctic) that are located, for example, next to gas production places. Upon careful consideration, such a project can be called a multidimensional system of sustainable production and consumption. Firstly, logistics risks (e.g., delivery delayed and cargo loss or damage on the way) and transaction costs are minimized and in some cases can be reduced to zero. Secondly, production costs could be minimized because the gas necessary to maintain the required temperature in the container greenhouse is practically free; the same could be said about generating electricity that could be used both for supplying light and warm inside container greenhouses as well as power supply for greenhouse control systems [34]. For such purposes small power units (<1 MW) exist on the market. These units are usually used in remote regions where connection to centralized networks is impossible or involves serious problems of engineering or economical nature. Small power generation is based on a wide range of processes and primary sources, including renewable and local ones, such as nonconventional hydrocarbon fuel comprising associated gas, biogas, coalmine methane, etc. Thirdly, the sea containers being the framework of greenhouses have been already delivered with goods to the Arctic could be bought cheaper from their owners because such a deal solve the problem of reverse logistics of empty containers. Fourthly, in the context of circular economy, there are now effective technologies that can turn the wastewater of Arctic settlements into a widely available and valuable resource [35]. As a result, a double effect takes place: (1) elimination of dirty water and (2) this wastewater becomes an additional resource that ensures the water use sustainability. Finally, and last but not least, such a decision is in good agreement with understanding the need to combine the principles of a circular economy with the goals of sustainable consumption and production. This briefly described case should serve as a successful example of complex solution combining needs and opportunities of the Arctic environment, people living and working therein, and innovative technologies.

Figure 4 Traditional model of consumer behavior modified to be matched with concepts of circular economy and sustainable consumers’ consumption

*a* Reconfiguring the marketing mix for the sustainability paradigm (Customer solutions, Customer cost, Convenience and Communication) [36].

*b* While the main part of this stimuli cold be controlled on the macro level of the Arctic environment there are exclusions – e.g., hydrocarbon primary sources for energy generation [37].

*c* Major areas of focus of sustainable consumption and production are [38]: food, housing, energy, transportation systems; or logistics systems (information flows included).

**Source:** designed by authors
4. Conclusions
Relying on the widely used and more recent definition that has been provided by the UNEP [39] – “SCP is a holistic approach to minimizing the negative environmental impacts from consumption and production systems while promoting quality of life for all” – and main outputs of our research it is possible to formulate some conclusions concerning the state of the Art and near future research concerning the role and place of consumers’ consumption in the frame of circular economy understood as the most suitable model for sustainable development of Arctic regions.

Firstly, the issues being under considerations herein are to be additionally and thoroughly, time and again, studied by international interdisciplinary research teams that could be organized even as virtual ones using modern information and communication systems. Outputs of such studies are to be worldwide distributed for further discussions and applications.

Secondly, despite the enormous role of technological and social innovations necessary for development of circular economy in Arctic regions, the human being who is understood as the starting and ending point of permanent functioning in the uninterrupted chain “…production–distribution–consumption–demand–production–distribution–consumption…” should be at the forefront of research. New research models for studying the consumers’ consumption (behavior) are to be designed and tested. In these models/ one has to go from the consumption sphere. It is believed that it is not without reason that in the established term “sustainable consumption and production – STP” it is precisely “consumption” that is put in the first place, which corresponds to the most important purpose of the sustainable development concept – to provide people of the Earth with a better quality of life.

Thirdly, while the main part of modern societies live in a system of values distorted by the value matrix of a consumer society, which is incompatible with the concept of sustainable development, the permanent and widespread education for sustainability has to be arranged on different levels – from elementary to higher school and in systems of permanent education – with the support of all media (especially Internet).

Finally, taking into account the contemporary insufficient level of conventional conceptualization of the scientific subject under consideration herein the international academic community must continue to scrupulously work to raise this level. The Russian part of this community faces an additional task – to achieve semantic adequacy in the construction of the Russian-language terminological paradigm of sustainable development, avoiding the so-called semantic confusion as a result of non-contextual translation.

5. Acknowledgement
The present article has been prepared based on the results of research carried out at the expense of budget funds according to a state assignment to the Financial University in 2019.

References
[1] SDG report 2019 In The Sustainable Development Agenda On-line URL: https://www.un.org/sustainabledevelopment/development-agenda/ (Retrieved at 30.08.2019)
[2] Sijabat R 2016 Promoting inclusive and sustainable development through social innovation and social entrepreneurship TECH MONITOR UK Jul-Sep On-line URL: https://www.researchgate.net/publication/319122333_Promoting_inclusive_and_sustainable_development_through_social_innovation_and_social_entrepreneurship (Retrieved at 02.08.2019)
[3] UNDP’s Strategy for Inclusive and Sustainable Growth 2017 On-line URL: https://www.undp.org/content/dam/undp/library/Poverty%20Reduction/UNDPs%20Inclusive%20and%20Sustainable%20Growth-final.pdf (Retrieved at 02.08.2019)
[4] WCED. Report of the World Commission on Environment and Development: Our Common Future 1987 On-line URL: https://sustainabledevelopment.un.org/content/documents/5987our-common-future.pdf (Retrieved at 02.08.2019)
[5] WSSD Report of the World Summit on Sustainable Development Johannesburg 2002 On-line URL: http://www.sulahinternational.org/the-world-summit-on-sustainable-development-johannesburg-2002/ Assessed: (Retrieved at 02.08.2019)
[6] Hiwaki K 2017 A Balance Paradigm for Post-Plutocracy: Toward Sustainable Development with Integral Harmony Systems 5(16) doi:10.3390/systems5010016
[7] Chakravorti B 2015 What Businesses Need to Know About Sustainable Development Goals Harvard Business Review November 20 On-line URL: https://hbr.org/2015/11/what-businesses-need-to-know-about-sustainable-development-goals (Retrieved at 02.08.2019)
[8] Bennett N J Blythe J Cisneros-Montemayor A M Singh G G and Sumaila U R 2019 Just Transformations to Sustainability Sustainability 11(14) 3881 https://doi.org/10.3390/su11143881
[9] Sustainable Development in Russia 2013 Eds S Bobylev and Perelet R Berlin – St. Petersburg
[10] Sustainable Development Strategies: A Resource Book 2002 Organisation for Economic Co-operation and Development, Paris and United Nations Development Programme, New York
[11] Working Together: Integration, institutions and the Sustainable Development Goals 2018 World Public Sector Report United Nations, DPADM On-line URL: http://workspace.unpan.org/sites/Internet/Documents/UNPAN98152.pdf (Retrieved at 02.08.2019)
[12] Elkington J 1994 Towards the sustainable corporation: Win-Win-Win business strategies for sustainable development California Management Review 36(2) 90–100.
[13] Daly H I 1990 Sustainable Development: From Concept and Theory to Operational Principles Population and Development Review 16 25-43
[14] Didenko N Rudenko D Skripnuk D 2015 Environmental security issues in the Russian Arctic International Multidisciplinary Scientific GeoConference Surveying Geology and Mining Ecology Management SGEM 3(5) 267-274
[15] Forbes B C 2007 Equity, Vulnerability and Resilience in Social-Ecological Systems: a contemporary example from the Russian Arctic Research in Social Problems and Public Policy 15 203-236 doi:10.1016/S0196-1152(07)15006-7
[16] Ford J D and Pierce T 2010 What we know, do not know, and need to know about climate change vulnerability in the western Canadian Arctic: a systematic literature review Environmental Research Letters IOP Science 5 014008 (9pp) doi:10.1088/1748-9326/5/1/014008
[17] Deborotoli N S Clark D Ford J D Sayles J and Diaconescu E P 2019 An integrative climate change vulnerability index for Arctic aviation and marine transportation Nature Communications 10(1):2596 DOI: 10.1038/s41467-019-10347-1
[18] Erkman S 2001 Industrial ecology: a new perspective on the future of the industrial system (President's lecture, Assemblée annuelle de la Société Suisse de Pneumologie Genève 30 mars 2001) On-line URL: https://www.esf.edu/for/germain/erkman%20-%20industrial%20ecology.pdf (Retrieved at 02.08.2019).
[19] A vision for sustainable consumption: Innovation, collaboration, and the management of choice 2010 World Business Council for Sustainable Development On-line URL: http://docs.wbcsd.org/2011/10/AVisionForSustainableConsumption.pdf (Retrieved at 19.09.2019)
[20] Wilner S J S and Gopaldas A 2010 Advancing the Production/Consumption Dialectic in Consumer Culture Theory Advances in Consumer Research 37 737-738
[21] Anderberg S 1998 Industrial metabolism and linkages between economics, ethics, and the environment Ecological Economics 24 311-320
[22] Didenko N I and Cherenkov V I 2018 Economic and geopolitical aspects of developing the Northern Sea Route IOP Conference Series: Earth and Environmental Science 80(1) 012012
[23] Bagiev G L Cherenkov V I and Cherenkova N I 2018 Marketing for implementing the concept of sustainable development: essence and terminological paradigm News of St. Petersburg State University of Economics 112(4) 139-152
[24] Cherenkova N I and Cherenkov V I 2006 Linguistic-communicative problem of business globalization News of St. Petersburg University of Economics and Finance 47(3) 109-124
[25] Kotler Ph Keller K L 2012 Marketing Management Pearson Prentice Hall
[26] Markus H Kitayama S 1991 Culture and the self: implications for cognition, emotion, and motivation Psychological Review 98(2) 224-253

[27] Didenko N and Skripnuk D 2018 Socio-cyberphysical systems and intellectual space in the development of the Arctic zone of the Russian Federation SHS Web of Conferences 44 00028 (2018) https://doi.org/10.1051/shsconf/20184400028

[28] Pogodaeva T V Zhaparova D V Rudenko D Y Skripnuk D F 2015 Innovations and socio-economic development: Problems of the natural resources intensive use regions Mediterranean Journal of Social Sciences 6(1) 129-135

[29] Sienra E Smith T and Mitchell S 2017 Worldviews, a mental construct hiding the potential of human behaviour: a new learning framework to guide education for sustainable development Journal of Sustainability Education 13 On-line URL: http://www.susted.com/wordpress/content/worldviews-a-mental-construct-hiding-the-potential-of-human-behaviour-a-new-learning-framework-to-guide-education-for-sustainable-development_2017_04/ (Retrieved at 02.08.2019)

[30] Scheunpflug A and Asbrand B 2006 Global education and education for sustainability Environmental Education Research 12(1) 33-46

[31] Wilhelm W B 2008 Marketing education for sustainability Journal for Advancement of Marketing Education 13 Winter 8-20

[32] El Ansari W and Stibbe A 2009 Public Health and the Environment: What Skills for Sustainability Literacy – And Why? Sustainability 1(3), 425-440; https://doi.org/10.3390/su1030425

[33] Bamsey M T Zabel P Zeidler C Gyimesi D Schubert D Kohlberg E Mengedoht D Rae J and Graham T 2015 Review of Antarctic Greenhouses and Plant Production Facilities: A Historical Account of Food Plants on the Ice 45th International Conference on Environmental Systems 12-16 July 2015, Bellevue, Washington On-line URL: https://www.researchgate.net/publication/280738927_Review_of_Antarctic_Greenhouses_and_Plant_Production_Facilities_A_Historical_Account_of_Food_Plants_on_the_Ice (Retrieved at 15.08.2019)

[34] Kosoi A S Popel’ O S Beschastnykh V N Zeigarnik Yu and Sinkevich M V 2017 Small gas-turbine units for the power industry: Ways for improving the efficiency and the scale of implementation Thermal Engineering 64(10) 723-728

[35] Kashulin N Skufina T Dauvalter V and Kotelnikov V 2018 Sustainable water use in the Arctic. New approaches and solutions Arctic Ecology and economy 4 (32) 15-29 DOI: 10.25283/2223-4594-2018-4-15-29

[36] Belz F-M and Peattie K 2009 Sustainability Marketing: A Global Perspective Chichester John Wiley & Sons

[37] Pyke T 2017 The energy debate: Renewable energy cannot replace fossil fuels DevelopmentEducation On-line URL: https://developmenteducation.ie/feature/the-energy-debate-renewable-energy-cannot-replace-fossil-fuels/ (Retrieved at 20.09.2019)

[38] Shibin K T 2016 Sustainable consumption and production: need, challenges and further research directions International Journal of Process Management and Benchmarking 6(4) 447-468

[39] UNEP United Nations Environment Programme n.d.a. What is SCP? Washington On-line URL: http://www.unep.org/resourceefficiency/ (Retrieved at 20.09.2019)