

Creative Arctic: Towards Measuring Arctic's Creative Capital

Andrey N. Petrov

This paper presents the key findings of the Creative Arctic Project. It focuses on the geography of creative capital and assesses its ability to foster economic development in the Arctic as an alternative or complement to recourse-based development. The study describes a theoretical conceptualization of the creative capital in the Arctic and provides further insights into the role of the creative capital in the Arctic economy. The paper explains methodologies and analytical tools (systems of measures/indicators) for the analysis of the creative capital as a factor of economic transformation in non-central regions. The study explores and compares geographic patterns of creative capital in the Arctic using spatial analysis techniques and data from all Arctic countries, as well as from two in-depth case study areas: northern Canada and Alaska. It also identifies Arctic regions and communities with sufficient creative capital, where further policy and place-specific studies could be conducted.

The findings suggest that some characteristics of the creative capital observed in Arctic communities are similar to those found in southern regions, whereas others are distinct. In the Arctic, the synergy between cultural economy, entrepreneurship and leadership appear to be more important in characterizing creative capacities than formal education. The geographic distribution of the creative capital is uneven and favors economically, geographically and politically privileged urban centers. However, some remote regions also demonstrate considerable levels of creative potential, in particular associated with Aboriginal cultural capital (artists, crafters, etc.). A number of Arctic regions – creative ‘hot spots’ – could become the test sites for implementing alternative strategies of regional development based on creative capital, knowledge-based and cultural economies.

Background: Creative Capital and Alternative Strategies of Economic Development in the Arctic

The literature has well documented that Arctic economies are marginal, vulnerable, structurally truncated and functionally dependent (Agranat 1992; Bone 2009; Bourne 2000; Rea 1968; Petrov 2012). The apparent inability of marginal regions to take advantage of new economic opportunities, especially those provided by the knowledge economy, received different explanations. Under the

classic core-periphery concept (Friedmann 1966), for example, resource frontiers are the last in line to enjoy the ‘trickle down’ and ‘diffusion’ effects from the core. Dependency theorists see little chance for peripheries to benefit from new economic opportunities in ways that alleviate dependency (Amin 2001). Others argue that “learning” (Morgan 1997) and endogenous growth (Romer 1990) in the peripheral regions are inhibited because of limited local capacities (institutional and infrastructural) and the lack of human capital (Hanson 2000). The disconnectedness of frontier firms from communities and networks of practice (Gertler 2005) prevents the transfer of tacit knowledge. In sum, most peripheries, including the Arctic, benefit neither from initial conditions, nor from internal or external processes that can induce a desired transformation.

In the last few decades, economists, business analysts, and economic geographers have demonstrated the decisive role of human capital in economic growth and development. Human innovativeness and creativity are the central pillars of a knowledge-based economy, which, in turn, is a cornerstone of contemporary capitalism. A number of studies provided empirical evidence and theoretical rationale for the relationship between economic development and the ability to attract and accumulate human capital (Desrochers 2001; Florida 2002; Glaeser 2000; Jacobs 1984). The link between the economic growth and human capital is closely associated with the notion of knowledge-driven growth (Romer 1990).

The literature on knowledge production, knowledge mobility, and regional innovation systems points to the pivotal role of human creativity in advancing regional and global economies (e.g., Desrochers 2001; Florida 2002, 2005; Polèse & Tremblay 2005; Schienstock 2007). In other words, it is conventional to cite human, and specifically creative, capital among the major drivers of regional development and to consider it as the key element of regional competitiveness. The ability of regions to attract and accumulate creative capital is perceived as a condition necessary for knowledge-based economic growth (Desrochers 2001; Florida 2002). Some authors proceed to claim that the innovators (i.e. the producers of knowledge) constitute a “creative class”, a group of individuals who are engaged in creative (i.e., scientific, artistic, or technological) types of activities, and, most importantly, translate their creativity into economic returns (Florida 2005). This research also highlights the distinction between human and creative capital: whereas the former is built on educational and skills assets, the latter includes these, as well as more informal and intangible assets linking a formal education with social networking, leadership abilities and artistic talents.

Whereas the importance of the creative capital in regional development and endogenous growth is hard to dispute, the research into this subject has focused almost exclusively on core metropolitan areas. Although the preoccupation with large urban centers reflects the concentration of the creative capital (Florida 2002; Gertler et al. 2002; Polèse & Tremblay 2005), this tradition unjustly marginalizes peripheries as study sites. Meanwhile, it may be argued that the importance of creative capital for economic development is not confined to large conurbations. Moreover, there is emerging evidence that creative capital in its widest reading is likely to play a defining role in the regional transformation of remote areas.

Recent studies demonstrate that there are examples of non-metropolitan communities which are able to develop a strong economic base and a successful diverse economy by relying on creative

capital (Beyers & Lindahl 2001; Boschma 2005; Gradus & Lithwick 1996; Selada et al. 2011). Petrov (2007) identified creative ‘hot spots’ within peripheral regions of Canada. These areas are found to have the potential to attract creative capital and compete nationally. In order for peripheries to become ‘hot spots’ of innovation and economic growth there has to be a connection to localized knowledge and social setting that can be formed with institution building and formation of civic society (Aarsaether 2004; Petrov 2011).

If that is the case, the question would be whether and in what form the idea of development based on local creative capital can be relevant and adaptable to the Arctic regions? A growing consensus among scholars (and, increasingly, among policymakers) is that social and economic development strategies in the Arctic must reconcile a postcolonial paradigm of the locally-oriented development and realities of the contemporary capitalism (including pressures and competition imposed by globalization). If one follows the argument of ‘constructive’ post-developmentalists (see Power 2003; Radcliffe 2005), an alternative development regime must be simultaneously based on emerging traditions of the post-industrial society, post-Fordist capitalism, and the postcolonial paradigm. In the Arctic regions, it also must be supplemented by the consensus between aboriginalism, environmentalism, industrialism and nationalism (Hayter et al. 2003). This complex task, in terms of regional policies, must result in ‘situatedness’, appreciation of local knowledge, promotion of local initiative, devolution of control, development of a knowledge-based economy, and so forth.

In this respect, the alternative strategy based on utilizing local creative capital to foster economic development appears to be appealing. As it is described below, there is preliminary evidence that such a scenario can be seriously considered. However, any research into this matter faces the lack of basic knowledge about the spatial distribution, characteristics and utilization of the creative capital, as well as the lack of conceptual and methodological foundations for conducting such a study. Sections below discuss theories and evidence that help to fill some of these important gaps.

Creative Capital and Economic Development in the Arctic: Theory

In a resource economy the physical value of a resource, not the amount of knowledge used for its production, provides a comparative advantage. Regional innovation systems depend on narrow flows of knowledge through a handful of agents, such as large corporations and the state (Bone 2009). Due to the monopolistic character of resource extraction there are few competing technologies or other forms of innovation that could challenge the dominant techno-economic paradigm (Clark et al. 2001). Consequently, the persistence of historically and socially embedded development trajectories, i.e. path-dependency, in the frontier remains exceptionally strong, preventing it from being successful in the modern economic competition. To ensure future prosperity, a regional innovation system must develop or adopt a new technological paradigm via economic, institutional, and social transformation.

The evidence from ‘lagging’ regions, for example in Europe, shows that in the case of such ‘lock-in’, there are two possibilities for a region: a new “path creation” (or “regional reinvention,” when a region develops new forms of competitiveness) or decline (Bathelt & Boggs 2005). Among the most important arrangements that can lead to a “new path creation” are the scientific, institutional,

economic and social shifts that allow inventing or adopting new knowledge (Bassanini & Dosi 2001). Schienstock (2007) argued that a window of new opportunities is opened up by a combination of a new knowledge paradigm, economic pressures to adapt to the new paradigm, change events that support transformation and available courses of action. Some of these ‘change events’ are in place in the Arctic: a pressure to foster sustainable development, new technological opportunities, the effects of globalization, regional self-determination and the devolution of power. However, a critical and necessary component of change is the *agents of transformation* (Schienstock 2007).

Human agency is a key transformative factor. Agents of transformation can be political institutions, firms or non-governmental organizations. However, in the end, the agents of change are individuals and their groups who ‘make’ the innovation history of the region (Bassanini & Dosi 2001). *Creative capital (CC)* may be defined as a stock of creative abilities and knowledge(s) embodied in a group of individuals who either possess high levels of education and/or are engaged in creative (scientific, artistic, entrepreneurial or technological) types of activities (i.e. “the creative class” (Florida 2002)).

So far, there is only limited evidence of the creative class’s transformative role in the periphery. The importance of creative individuals in innovative processes in remote regions has been highlighted in a number of studies from different regions (Aarsæther 2004; Ferrucci & Porcheddu 2006; Hayter et al. 1994; Petrov 2008, 2011; Hall & Donald 2009; McGranahan et al. 2010; Stolarick 2012). Some researchers observed that less favorable business and social environments of the periphery amplify the importance of creativity and require individual innovators and firms to be more creative than in the core (Aarsæther 2004; North & Smallbone 2000; Petrov 2011). More recently, a formal analysis by McGranahan & Wojan (2007) and McGranahan et al. (2010) indicated that major conceptual links between the creative class and economic development exist in American non-metropolitan settings.

It is difficult to argue that the creative capital in the peripheral northern communities can make them successful in competing with national and global innovation powerhouses, but it is plausible to suggest that the availability of this factor improves the prospects for future economic transformation and development. This, however, remains the subject of the ongoing research. A necessary first step involves empirical studies of the nature and spatial distribution of creativity in the Arctic.

Methodology

Much of the creative capital literature is devoted to developing measures to quantify the creative capital. A chosen set of indicators (Table 1) consists of two groups: measures of the creative capital and a proxy of the knowledge sector (Tech Pole Index). The indicators follow the four sector approach proposed by Petrov (2007) and incorporate measure of four types of creative capital: scientists, bohemians, entrepreneurs and leaders, as well as the *Talent Index* that measure educational attainment beyond bachelor’s degree. Indices used for four types of creative capital are based on occupational statistics (Table 1). The indicators are defined as location quotients (Petrov 2008). The *Tech Pole Index* (TPI) is used as a proxy of a community’s specialization in high technology sectors

(Table 1). The TPI was first developed by the Milken Institute and later used by Florida (2002) and many other creative economy studies as an indicator of a region's high technology specialization. The TPI is calculated here as a location quotient of the employment in high technology sectors.

The following analysis first computed, tested and analyzed the indices that characterize the creative capital in the Arctic regions (where data were available). The definition of the Arctic roughly followed the boundaries used by the Arctic Human Development Report (AHDR 2004). Most Arctic jurisdictions had relevant data to measure the Talent Index (Table 1) that is based on educational attainment and corresponds to one of the traditional measures of human capital (Hirshberg & Petrov 2014), albeit calculated as a location quotient. The data for other CC indices is fragmentary and the analysis includes only regions where such information exists.

The paper also offers two case studies to illustrate regional characteristics of CC, in this case, in the North American context: the Canadian Territories and Alaska. Data for these case studies were obtained from the Canada's Census and U.S. American Community Survey.

Table 1: Description of the Metrics

Measures	Construct to be measured
Creative Capital/Class metrics	
<i>Talent Index (TI)</i> is a location quotient of the population over 20 years of age who have a university degree.	Level of formal education of the labour force
<i>Bohemian Index (BI)</i> is a location quotient of the employment in artistic and creative occupations: "Art and Culture"	Creative class: bohemians
<i>Leadership index (LI)</i> is a location quotient of people with leadership and managerial occupations	Creative class: leaders
<i>Entrepreneurship index (EI)</i> is a location quotient of people with business occupations	Creative class: entrepreneurs
<i>Applied science index (ASI)</i> is a LQ of people with applied science occupations	Creative class: scientists
Measure of technology sector specialization	
<i>Tech-Pole Index (TPI)</i> is a location quotient of the employment in North American Industry Classification System (NAICS) high technology sectors (information and cultural industries and professional, scientific and technical services).	Specialization in technology sectors

Source: adopted from Petrov, 2008

Creative Capital and Economic Development in the Arctic: Evidence

The centrality of creative capital (CC) in regional reinvention in the periphery appears to be especially important in respect to breaking with path-dependency and facilitating regional breakthrough. Community-level research conducted in peripheral areas, mostly outside the Arctic, squarely points to a pivotal role of creativity (spanning beyond education, experience or technical expertise or any other “traditional” attributes of human capital) in local economic success. For example, the study of local innovation in northern Scandinavia stressed “the importance of key local actors in innovative processes that take place in remote regions”. The authors concluded, “almost every innovation has had a clear core agent to manage the process. Very often this agent, initiator and ‘engine’ of the process has been a local person, who has committed him/herself to the development of a new idea” (Aarsæther 2004: 244). Similar evidence has been cited in other marginal regions (e.g. Hayter et al. 1994; Stohr 2000; Petrov 2011), where members of the creative class, particularly entrepreneurs and inventors, have been credited with revitalizing economies in their communities. All these suggest that the creative class is an important and organic ingredient of local development in the periphery.

Figure 1 presents *Talent Index*, *Leadership Index* and *Bohemia Index* maps for the circumpolar region. The indices are calculated at the regional level. First of all, it is evident that most Arctic regions have relatively weak CC. At the same time, there are areas that have high TI, LI and BI. In particular, Yukon, certain parts of Russia (e.g., Murmansk and Yamal-Nenets regions) and northern Scandinavia demonstrate levels of TI near or exceeding 1.0 (i.e. respective national averages). In fact, Yamal-Nenets Okrug and Kamchatka Oblast were ranked 9th and 10th among top Russian regions in 2002. In contrast, many areas with a majority or significant proportion of Indigenous population tend to exhibit lower levels of TI, pointing to a persistent education gap between the two groups of Arctic residents (see a more in-depth overview of this in Hirshberg & Petrov 2014). At the same time, some Arctic regions register a remarkably high LI [a pattern observed in other studies (e.g., Petrov & Cavin 2013)]. The highest indices are associated either with larger urban and administrative centers or with very remote and sparsely populated regions. The geographic distribution of BI largely reflects the prevalence of Indigenous population. Most Arctic regions exceed national baselines in relative proportion of residents with occupations in arts and culture suggesting a presence of cultural capital and a considerable potential of Arctic cultural economy. In Russia, Taimyr, Koryak, Chukotka Okrugs and Republic of Yakutia ranked among top 10 regions in terms of BI in 2002.

If CC metrics are well documented at the regional level, data constraints limit our ability to measure CC at the municipal level. The educational attainment data required for computing *Talent Index* are mostly accessible. TI is also the most directly comparable indicator (as it is not based on occupation classifications). At the same time, occupational characteristics of population are available only fragmentarily. As a result, the city-level analysis focuses on TI. It includes Arctic cities selected based on population (generally exceeding 20,000) and “regional importance” (all regional capitals, if available, are included).

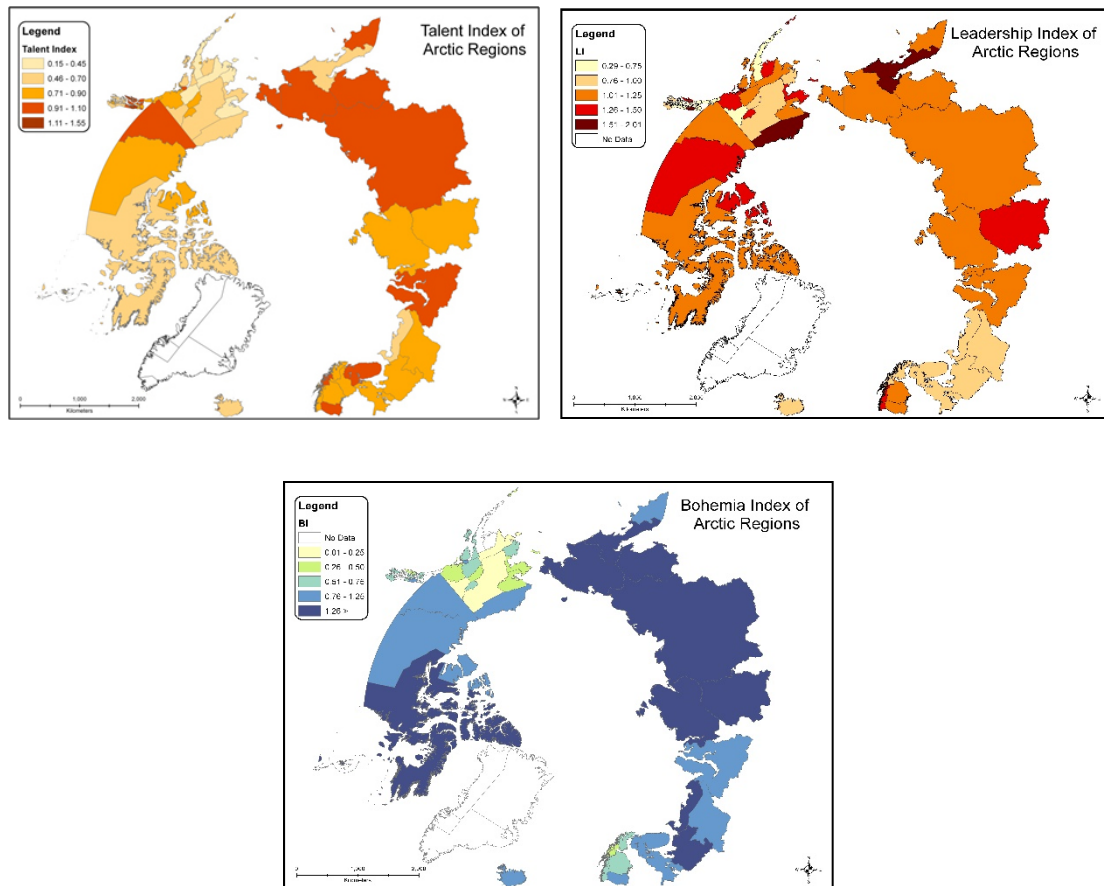


Figure 1. Creative Capital Characteristics of Arctic Regions

As seen in Figure 2, Arctic cities demonstrate varying degrees of ‘talent’ concentration. Some are certainly ‘creative hot spots.’ for example, Anadyr’s TI (1.72) that is comparable to Moscow’s (1.79). Very high TI is also recorded in other regional (and national) capitals both in Russia and across the Arctic, including Salekhard, Yakutsk, Umea, Magadan, Juneau, Yellowknife, Tromsø, and Reykjavik. Another large cluster of highly educated labor force is observed in Yamal-Nenets Okrug: in addition to Salekhard, Novy Urengoy and Nadym have TI above 1.4. This may reflect the influx of educated labor migrants in the last decade as TIs in these cities exhibited substantial growth in TI between 2002 and 2010.

These observations should not disguise a wide gap in educational attainment (and thus TI) between urban and rural areas in the Arctic. For example, in the most urbanized part of the Arctic, the Russian North, the percent of formally educated individuals with a post-secondary degree varies from region to region between 5 and 20% (Hirshberg & Petrov 2014).

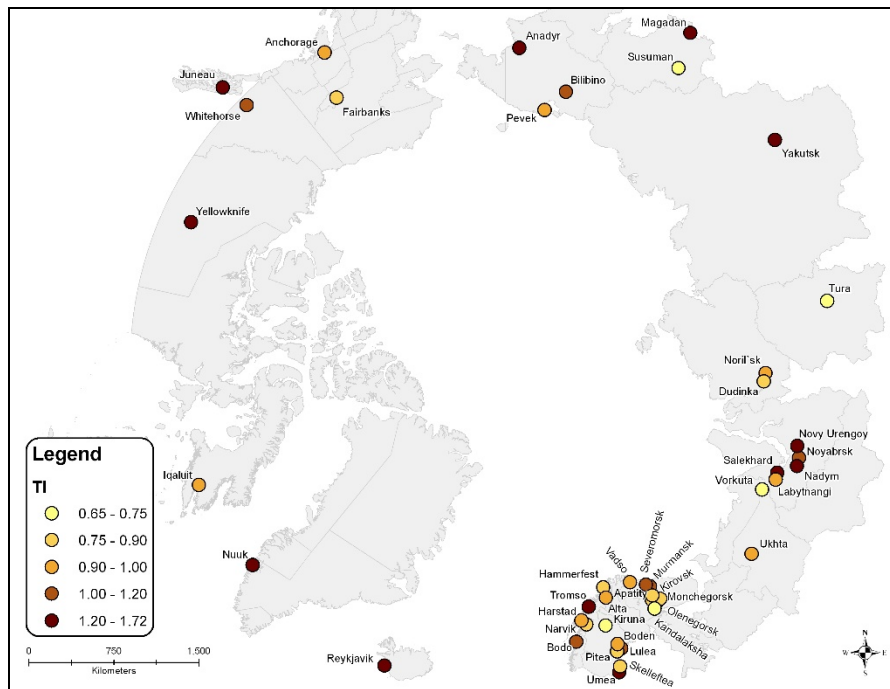


Figure 2: Talent Index (TI) in Selected Arctic Cities

Case Study 1: Creative Capital in the Canadian Territories

The two case studies presented below are used to provide more region-specific evidence and illustrate relationships among creative capital groups in Canada and Alaska. The findings confirm that the creative capital is present in the North in considerable quantities, albeit heavily clustered in certain communities and regions. Whereas Arctic regions have variable levels of creative capital (whether examined at the circumpolar or regional scale), many of them have higher-than-expected creative resources.

This section provides an abbreviated description of the creative class metrics analysis for 27 Canadian communities (Territorial communities with population larger than 500). The geographies of individual indices reveal regional inequalities and clustering of CC in northern Canada (Figure 3). The *Talent Index* (calculated as a location quotient using Canada as a baseline) demonstrates a wide gap between capitals and the rest of the Territories. Some regional centers, such as Inuvik and Fort Smith, also perform relatively well. However, the majority of Arctic communities exhibit TI levels under 0.7, i.e. well below the Canadian benchmark. In contrast, the Territories have considerable leadership (*Leadership Index*) and cultural capital (*Bohemian Index*). This is especially true for Nunavut communities, many of which serve as regional centers and have strong localized cultural economy based on traditional arts and crafts (Nordicity Group 2010). A notable outlier is Cape Dorset (BI >5.0), a settlement with a long history of commercialized print production that has the reputation of being one of Canada's most artistic communities (Alsop 2010). At the same time, most Arctic communities lack *entrepreneurial capital*, i.e. have a very low percent of residents with business occupations. This fact illustrates an entrepreneurial disconnect observed in other peripheral regions (Petrov 2011; Petrov & Cavin 2013).

The *Tech-Pole Index* (TPI) demonstrated that only a few northern communities have a considerable concentration of high-tech employment and specialization on technology-intensive industries. Only Yellowknife and Whitehorse have slightly higher shares of high-tech employment than Canada. In old industrial towns, the technology sector is particularly small.

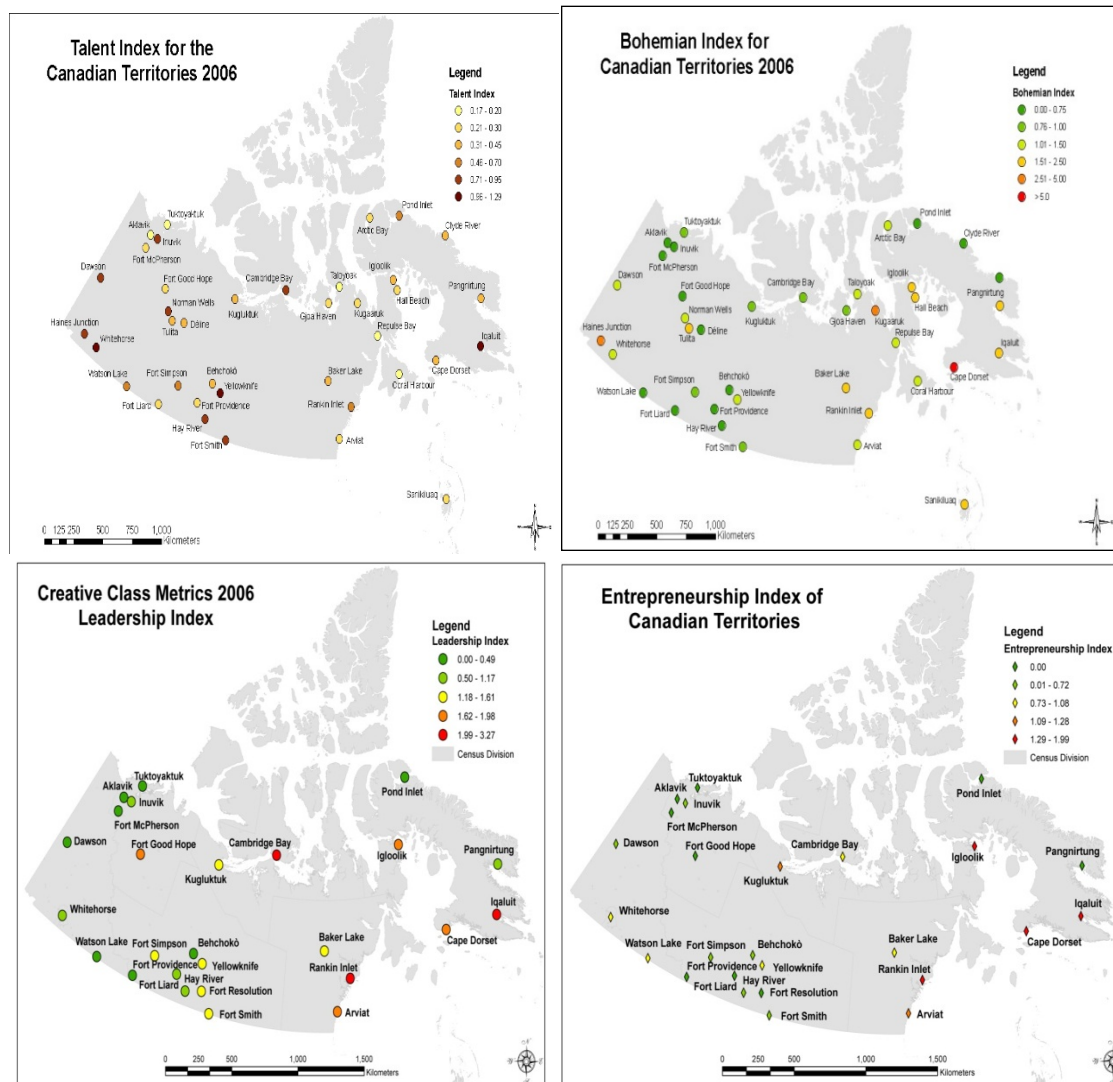


Figure 3: Creative class Indices in Canadian Territories

Correlation coefficients confirm close associations (Table 2) among different creative capital indices. Correlation results (Table 2) strongly support the idea that different groups of creative capital are clustered in space. Four kinds of creative capital, most likely, attract each other, and creative clusters exist as self-reproducing creativity centers. That is why, for example, previous studies found the concentration of bohemians useful to explain the attractiveness of cities to the talent (Florida 2002). However, in the Arctic there is a visible disconnect (i.e. the lack of correlation) between educational

attainment (TI) and other creative capital indices. This indicates that creativity in the Arctic may manifest itself in the forms that are not necessarily associated with formal education. In addition, in the Canadian North indices designed to account for Aboriginal population perform better than generic ones (Table 2).

Table 2: Correlation Matrix of Creative Capital Indices, Canadian Territories***

	TI	TPI	ASI	BI	LI	EI
TI	1	.632*	.497**	-.059	.322	.396*
TPI		1	.511**	-.022	.345	.203
ASI			1	-.073	.132	.233
BI				1	.429*	.611**
LI					1	.669**
EI						1

* Correlation is significant at the 0.05 level (2-tailed); ** correlation is significant at the 0.01 level (2-tailed), *** see notations in Table 1.

Evidence suggests that the associations among indices closely resemble those at the national level, thus indicating that the creative class 'logic' is applicable to peripheral areas. The consistence of associations shows that the major relationships are upheld, and the behavior of the creative class metrics is very much alike the rest of the country. The creative capital in the periphery shows signs of the intergroup clustering (among LI, BI, EI and ASI) and association in the same manner as at the national scale (Petrov 2007).

The final ranking of northern Canadian concinnities was derived by combining equally weighted rankings of the individual creative class indices (TI, LI, EI, BI and ASI). A group of leading communities emerged at the top of the rating: Iqaluit, Yellowknife, Rankin Inlet, Cambridge Bay, Whitehorse, Norman Wells and Cape Dorset, most of them are regional centers in the Territories. In sum, the analysis of the creative class structure provides evidence of both intergroup clustering and disproportions. The North most seriously lacks the entrepreneurship and leadership components of the creative class: only a few northern communities have a considerable entrepreneurial class.

Case Study 2: Creative Capital in Alaska

The second case study was devoted to Alaska's 27 boroughs. Overall it found the higher-than-expected levels of the creative capital accumulation in Alaska (although still quite low compared to the continental U.S. creative hubs). The Talent Index (TI) is 0.78, Applied Science Index is 0.84, and the Entrepreneurship Index (EI) is even lower (0.61). However, the analysis shows that few boroughs are creative capital 'hot spots.' Many of the leading places (albeit not all) are economically or politically privileged boroughs, which encompass the state's capital and its largest cities

(Anchorage and Fairbanks). These hot spots are, perhaps, nationally competitive in terms of attracting the CC. They are places where the creative potential is high, and where the community's efforts to embrace a new economic trajectory would be the most fruitful.

The Talent Index (TI) in Alaska exhibits a pattern typical for the Canadian Territories. TI approached or exceeded 1.0 (U.S. average) in the capital (Juneau) and surrounding regions (Figure 4). Here, similarly to Whitehorse and Yellowknife in Canada, we observe a concentration of residents with high levels of formal education, most probably public employees. Fairbanks and Anchorage follow the capital region with well-educated populations. In contrast, most rural regions demonstrate a very low Talent Index.

The Applied Science Index (ASI) reflects the relative concentration of people with occupations in applied science and technology. Not surprisingly, again the larger urban centers (Anchorage, Fairbanks and Juneau) had high levels of the ASI comparable or exceeding those in Yellowknife and Whitehorse. The outlying areas of Alaska demonstrate extremely low stock of people with science and technology occupations.

The Bohemian Index (BI) is used to measure the 'artistic capital' as a separate category of creative capital, to a large degree associated with the Native arts and crafts. In Alaska high BI was registered in two completely different types of regions: larger city-regions (Anchorage and Juneau) and the North Slope Borough. This most likely reflects two distinct types of 'bohemia' that co-exist in the state: the Native American 'bohemia' in the very north and urban 'bohemia' in the urban south.

The role of political and civic leaders in economic development in Arctic communities can be considerable given their close involvement with local businesses and access to capital (e.g., government assistance programs). The high *Leadership Index* was registered in the capital and central cities, such as Juneau and Anchorage. The LI is also high in the North Slope Borough, and 11 more boroughs have LI higher than the USA average. At the same time, remote and inland regions of Alaska clearly lack the leadership capital.

The Entrepreneurship Index (EI) shows that entrepreneurial capital is clustered in Anchorage and Juneau. This, as in the case with the TI and the ASI, reflects a pattern of creative capital overconcentration in centrally located hubs and shortage of entrepreneurial capacities in the state's periphery. Similarly to the Canadian North, there is a geographic disconnect between the entrepreneurial and other forms of creative capital (e.g., bohemian) associated with these areas and its Native population.

Finally, the *Tech-Pole Index (TPI)* demonstrates that very few Alaskan boroughs have specialization in technology-intensive industries. With the exception of Bristol Bay and Northwest Alaska all of these regions are concentrated in the southern and southeastern portion of the state around Anchorage and Juneau. Even there, though, the TPI values are not high, but comparable with those found in the Canadian territorial capitals. The absence of significant relationship between the specialization in high technology industries (TPI) and any of the creative capital indices is a notable deviation from the national studies in the USA and Canada and from the results in northern Canada. It is, indeed, surprising, since typically TPI is correlated with well-educated and abundant human capital. In

Alaska high-tech activities appear to be unrelated to local educational attainment or creative capital (although TI and the TPI still have considerable covariance). The concentration of high-tech employment is, perhaps, governed by other factors such as location of government agencies and universities.

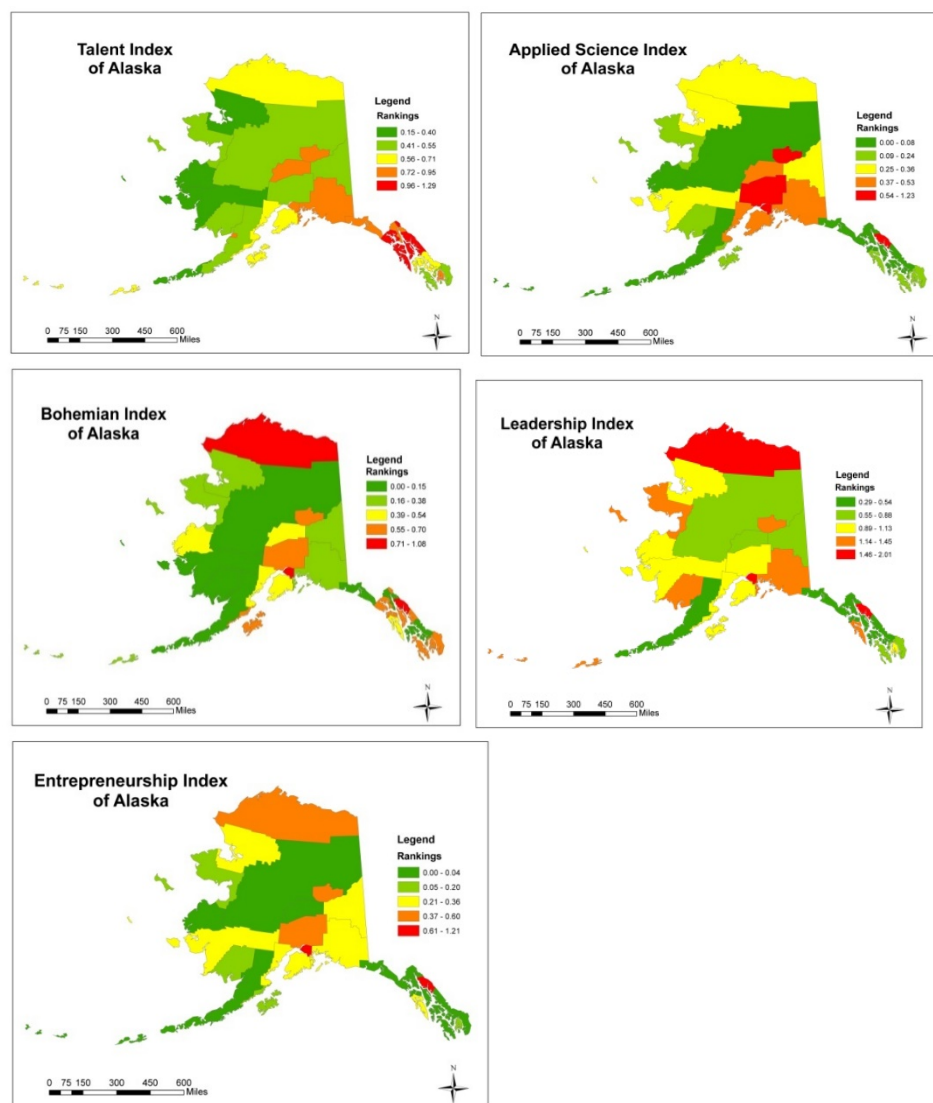


Figure 4: Creative Capital Indices in Alaska

In accordance with the adopted methodology, correlation coefficients were used to assess the consistency (reliability and validity) of the creative capital measures and to statistically analyze the relationships among them. Correlation coefficients illustrated close associations (Table 3) among different creative class indices that were a likely sign of reliability of these measures. These results are very similar to those reported for the Canadian northern communities.

The evidence from the correlation matrix (Table 3) supports the notion of *creative synergy* (Petrov 2008) that different groups of the creative capital are clustered in space. ASI, BI, LI and EI are strongly correlated. Four creative class groups attract each other and reinforce region's innovative potential. Separated or disjointed, these components are much less powerful or even fruitless, because regional development (or a 'new path creation') may require simultaneous deployment of various modes of creativity and types of innovation.

Table 3: Correlation Matrix of Creative Capital Indices, Alaska***

	TI	TPI	ASI	BI	LI	EI
TI	1	.185	.375	.337	.215	.404*
TPI		1	.225	-.029	-.044	.203
ASI			1	.701**	.659**	.897**
BI				1	.647**	.655**
LI					1	.780**
EI						1

* Correlation is significant at the 0.05 level (2-tailed); ** correlation is significant at the 0.01 level (2-tailed), *** see notations in Table 1.

The cumulative ranking of Alaska boroughs based on five equally weighted creative capital indices (TI, ASI, BI, LI, and EI) reveals that the highest ranked regions are mainly the urban areas: Juneau, Anchorage and Fairbanks. This pattern strongly resembles the Canadian North where three territorial capitals and largest cities are also the top-ranked creative capital hubs. However, the fourth place in Alaska is taken by the North Slope Borough – the most northern of state's boroughs. A strong performance of the North Slope points to the fact that remote areas may have considerable concentrations of creativity.

Discussion and Conclusions

The findings presented in this paper and by the Creative Arctic project in general (Creative Arctic 2014) largely confirm both theoretical and methodological frameworks outlined in the previous sections and indicate the adequacy of the chosen research direction. Below we formulate some key conceptual and policy-relevant observations that stem from the undertaken analysis. In some sense this opens the gate for further examination of creative capital and its role in the Arctic economy, and serves as the foundation for localized case studies, such as the investigation of creative and knowledge economy in a given Arctic community or a region (e.g., Voswinkel 2012). It should be noted, however, that some of the conclusions while applicable in the North American or Scandinavian context, may not be entirely relevant in the Russian Arctic, and vice-versa.

Contrary to the metropolitan bias, our results indicate *that northern communities are not 'hopeless places' fully deprived of the creative capital*. Creative 'hot spots' in the North exist, and could become the centers

of regional reinvention. The analysis shows that the creative class in northern regions is diverse (represented by four major groups) and the groups are clustered (as expected). However, there is a considerable (and systematic) difference among various types of communities. For example, Aboriginal communities are strong on bohemia (cultural creative capital), but typically are weak on entrepreneurial capital (this mismatch points to a fundamental impediment to developing profit-making cultural economies in Aboriginal communities). Overall, Aboriginality appears to be positively related to creativity.

In respect to the conceptual discussions, it is important to point out that our findings, while being in line with the overall “creative capital theory,” counter some stylized representations and illuminate peculiar role, structure and geography of the CC in remote, peripheral areas. Arctic regions demonstrate the associations among CC indices closely resembling national patterns (thus indicating that the creative capital ‘logic’ is applicable in the peripheral context). The coincidence of statistical associations indicates that the major relationships are upheld, and the behavior of the creative class metrics is very much alike the rest of the country. At the same time, there are important differences, which emphasize the unique place of the Arctic in the creative capital theory. The following emerging theoretical themes define the conceptual and empirical substance of CC research in rural and remote areas.

Increasing role of CC (and demand for CC) for economic well-being, fate control and human development in general. Although by a standard definition CC in the Arctic is underdeveloped, it could be argued that this representation no longer reflects the variability and diversity of Arctic regions, some of which demonstrate substantial levels of creativity that is based on non-codified informal knowledge and therefore might not conform to the stylized notion of CC. On the other hand, there is a strong theoretical argument that CC is critical for economic development and socio-economic transformation in the Arctic as it often becomes the engine of economic reinvention and revitalization of a region.

Clustering and synergy of CC in the periphery. Correlation coefficients illustrate close associations among different creative class indices. Different groups of the creative capital are clustered in space. Applied Sciences (ASI), Bohemian (BI), Leadership (LI) and Entrepreneurship (EI) indices are strongly correlated. Different types of CC attract each other and reinforce region’s innovative potential. Separated or disjoined, these components are much less powerful. It is likely that a local synergy between CC and social capital (contrary to the metropolitan notion of the “weakness of strong ties”) is an important component of economic success. In addition, a strong creative capital coincides with top levels of attractiveness. The idea here is that ‘creative synergy’ is a critical condition for utilizing local creative capacities.

Persistence of education and CC gaps: In terms of educational attainment (Talent Index) we observe the following persisting gaps (1) between most Arctic and southern metropolitan regions; (2) between urban/industrial Arctic territories and the rest of the Arctic; and (3) between Indigenous and non-Indigenous population in the Arctic.

Gains in post-secondary education (Talent index) in the last decade were observed in many Arctic regions. For example, in the NWT 47.6% of population over the age of 15 years old had certificate, diploma or degree beyond high school in 2009, versus 46.5% in 1999. In 2009 there were 3.3 times more Aboriginal people with university education than in 1999 (NWT Bureau of Statistics 2014).

Feminization of CC is the consistent trend of the last decades. Women dominate the realm of education in most of the Arctic. Already in the 1990s women had become the majority group in relation to higher education in several countries. Northern Scandinavia, Russia and Alaska are three areas with the most feminized human capital. Only parts of Canada show a continued dominance of males in relation to post-secondary education, a situation attributable to both women's departure to pursue educational opportunities and influx of educated male labor force attracted by the resource sector. In communities with a generally high concentration of people with postsecondary education – first of all the urban areas with one or more higher education institution – female dominance is limited to a few percentage points.

Peripheral disconnect: geographic disconnect between the entrepreneurial and other forms of the creative capital.

Uneven geography and differentiation: the analysis reveals a very uneven geography of the creative capital in Alaska. The pattern is characterized by the dominance of economically privileged, larger communities. However, there is a number of Indigenous 'creative hubs.'

The 'blessing of remoteness' concerns possible positive impacts of remoteness on CC accumulation (e.g., Copus & Skuras 2006; Petrov 2008), when remote areas (for example the North Slope Borough) may have higher concentration of CC than less northern or less remote areas. This phenomenon while primarily caused by the influx of temporary migrants employed in extraction industries, may also indicate a higher level of creative potential, independence and self-reliance of remote areas compared to less remote peripheries. Remote settings may also be more attractive to creative individuals and provide better conditions for retaining local creativity (such as Indigenous cultural economies).

Bifurcation of 'bohemia': BI is high in larger city-regions (Anchorage and Juneau) and the North Slope, which reflects two distinct types of 'bohemia' that co-exist: the Indigenous and urban/western. These two groups have dissimilar characteristics and require different conceptual and analytical approaches to their study.

High mobility of CC in the Arctic, prevalence of 'brain drain,' 'brain turnover' (intensive in- and out-migration of creative capital) and 'brain waves' (surges and dips of CC associated with the boom-and-bust economic cycles).

Lastly, it is important to point to a sentiment expressed by others (Aarsæther 2004) that innovation in the periphery may require more creative effort, originality and ingenuity to overcome barriers and capacity shortages than in central areas. We can also argue (although evidence is still more anecdotal than systematic) that innovation (and even individual acts of innovation) in the periphery can have stronger impact on community's/region's economic path, and can be more pivotal for a "new path creation" for a given remote locale.

Findings presented in this paper warrant further studies that will conduct analysis at individual community level (rather than regional) and, if possible, will use more detailed occupational data. There is more to learn regarding the role of distance and proximity, the importance of pull and push factors (such as harsh environment, housing problems and isolation) on creative capital, and the nature of intricate relationships between human, creative, social, civic and other forms of societal capital. Future research should also consider possible negative externalities of creative economies, such as economic inequality, housing affordability, environmental impacts, over-consumption, and political infighting.

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