OPPORTUNITIES AND CHALLENGES OF DEVELOPING THE NORTHERN SHIPPING PASSAGES

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Introduction

The aim of this research is to study the implications of the topographical changes in the Arctic and how this affects the NSP, this will also include all the historical countries involved by bordering this territory. It is said that, due to climate change and global warming, the Arctic Ocean is undergoing some significant topographical changes. There increasingly less ice, and this is opening up new opportunities for shipping routes. It has been proposed by Kefferpütz (2010) that, before the end of the twenty first century, the temperatures in the Arctic are expected to increase from four to seven degrees Celsius (p. 1). The earlier models predicted that the Arctic could be ice free by the summer of 2030. Evidence showed that in 2008 there was a 65 percent decrease in Arctic ice. The greatest decrease in the summer Arctic ice caps on record was from 2007 to 2009. Although, there is not a 100 percent accurate date as to when the Arctic will be free of ice, Canada and other Northern countries should begin to strategize how to utilize the new Arctic passages that will becoming available. This could involve setting up new shipping routes, navigational aids, ports, and developing new equipment to deal with icy conditions. Not only does the Arctic offer new shipping routes, but also, 13 percent of the world's oil reserves and 30 percent of the world natural gas resources are said to be in the Arctic. Therefore, the objective of this paper is to compile information on the relevance of the fast approaching prospect the Artic has to offer. Decisions need to be made on ownership of territory and the paper shows recent territorial disputes and developments. The prospects of sovereignty is outlined, which involves what individual countries are doing to maintain sovereignty or develop ownership over the NSP. Also, what sort of interests does the marine shipping companies have in reducing their travel distance, through the use of the NSP, this includes the cost and lead time delivery savings that the NSP can offer. Finally, the technology and equipment development considers what investments are required to make the regular use of NSP possible (Kefferpütz, 2010).

Due to the time significance, where the prospects of the NSP may become available sooner than theorized, this paper researches recent information regarding the Arctic and what studies have been conducted regarding the relevance of sovereignty, shipping prospects, and cost savings. The research method is exploratory research based on evidence which suggest that the availability of Arctic shipping routes is fast approaching. This needs to be researched so that Canada can gain a stronger perception on what similar positions it can take when compared to other countries bordering the Arctic, in order to obtain ownership over the Northwest Passage.

Literature review

With less ice in the Arctic, there are opportunities for new shipping channels to open up. These can link Europe from the Northeastern Coast to Asia. Especially intriguing is Canada's Arctic Archipelago Northwestern Passage or through Russia's Northeastern Passage. Whereas, with the use of Northern Shipping Passages (NSP), this paper encompasses all possible shipping routes in the Arctic Ocean. These new shipping prospects are only a matter of time. However, the new shipping routes are a threat to Canada's sovereignty; and, Canada should be aware of these new northern shipping route prospects in order to take first mover advantage and ensure its control in security and navigation of its northern coastal border. In December of 2009, the House of Commons voted to name the North West Passage instead of "Canadian Norwest Passage" (p. 794). However, this does not mean the rest of the world is on board with Canada's claim to the north (Lasserre & Pelletier, 2011). When referring to the Northern Shipping Route (NSR), this entails a route that is between the Atlantic Ocean and the Pacific Ocean, which this is along Russia's boarder of Siberia and then crosses five Arctic seas; which include: Barents Sea, Kara Sea, Laptev Sea, Eastern Siberian Sea, and Chukchi Sea. The NSR includes all possible routes between the Atlantic Ocean and Pacific Ocean which makes use of the eastern part of the Atlantic Ocean. (Liu & Kronbak, 2010). It was first referred to as the Northeastern Passage, until the beginning of the 20th century. It is the shorter routes, which these northern passages can offer that are so alluring; however, there is a lot to consider before opening these new routes to numerous shipping companies (Lasserre, 2011).

Canada's Position on its claim to the Northwest Passage

Canada's initial claim to the Northwest Passage started in 1909; where, a proclamation by Senator Poirier divulged that Canada could enact lines from its furthest north eastern and north western points, then connect them to the North Pole, and this would be seen as Canadian territory (Rothwell, 1993). However, sovereignty is a very complex issue especially when you add in the Arctic. At certain times of the year the Arctic is solid, and others there is open water, this makes territory difficult to normalize. Along with that there are Inuits who are native to the area and have established use of this area when it is frozen or thawed. This aids Canada to establish what Johnston (2002) calls "internal sovereignty" (p. 146). Some of the numerous objectives to consider when it comes to Sovereignty, would include: political, public, military, geographical, laws, principles, and environmental management. All these put together only complicate matters, when considering who has the supreme claim over the Northwest Passage. Also, if Canada can not demonstrate a strong effort to control these, where its Arctic north is concerned, it is likely that other candidates will attempt to move in (Johnston, 2002).

Canada's standing with Sovereignty

A relative type of sovereignty, which is not considered absolute, would be Johnston's explanation of "external sovereignty" (p. 146). This is represented by the external form of a state's sovereignty, which comes from a global framework, a basic notion of interstate sovereignty stemmed from neighboring states. From a comparative point of view, it can be pointed out that Canada does not quite contribute to being an effective and secure member of an inter-state system. This would be better demonstrated if Canada had control over all activates that took place in the arctic. Probably seen as the initiator to a decline in Canada's external sovereignty, would be where, vessels in 1968 and 1970, respectable the *Manhattan* and the *Polar Sea,* traveled through the Canadian Northwest Passage without consent. This demonstrated to other nations a vulnerability that Canada may lack the resources to adequately patrol the north (Johnston, 2002). However, at the same time this encouraged Canada to increase its patrol efforts in the Arctic. Also, Canada is attempting to establish a Polar Code, which is based on the approval of the International Maritime Organization (IMO). Although, as of yet the Polar Code is in draft form. This code will update old legislation, which for Canada's old legislation permits the dumping of raw sewage in the Arctic. Carbon emissions is also in consideration for the Polar Code; and, research is being conducted to

determine how much CO_2 emissions could affect the Arctic's environment, considerations will include local and global contributors to adequately guide the policy. Receiving approval from the IMO, would have been less abstruse if Canada were to have included the Arctic in extending the North American Emissions Control Area (ECA). However, at the time the Arctic was not included, due to its limited population and sparse marine traffic. Also, Canada has an interesting position when arguing its shoreline ownership. In 1970, Canada adopted the Arctic Waters Pollution Prevention Act (AWPPA), which claims 200 nautical miles from Canadian shores is to be deemed under Canadian shipping regulations (Gedeon, 2013).

Political Risks

With the increase in access to new shipping territories there are five countries that have stakes in the northern shipping route: United States, Russia, Norway, Canada and Denmark. These territories are either adjacent to or encroaches the Arctic Ocean. Canada and the United States are in conflict over who should hold the legal title over the Northwest Passage. United States deems it to be an international straight that should fall under international law. However, Canada opposes this, claiming that it is a historic internal water way. Settling this argument is essential because this will determine which party has the jurisdiction and control of the new opportunities, which can offer: environmental, strategic control, and new commercial possibilities. Similar arguments take place with the Northern Sea Route, and currently, Russia states that it falls under the underits jurisdiction. As ice melt accelerates, these disputes will only intensify (Howard, 2009). Contrarily Haakon Bruun Hanssen, an admiral of Norway, states that the Arctic is "probably the most stable area in the world" -this is seen with all countries following the rules, and legal norms are established (The Roar of Ice Cracking, 2013, p. 49).

In addition to the political discontent between the countries mentioned above, there are also powerful NGO's (None Government Organizations) that may oppose the development of the Northwest Passage, claiming ecological damage. For example, Vladimir Chuprov- head of Greenpeace/ Russia's energy program- has said "there is no possibility, in Russia or any other Country, to develop this route in an ecologically safe mode" (Weir, 2009).

Russia's Claim in the Arctic

Russia has demonstrated interest in the Northeastern Sea Route back in the late 19th century and early 20th century. Around 1910, Russia began to send its navy out to map and explore the Northeastern Sea Route. To exercise sovereignty in soviet times there were several permanent polar station erected, and during this period, numerous flags were planted to stake territory. New state boarders were established by the Soviet Union in 1926, where 5842 kilometers from the North Pole to the Bering Strait and Kola Peninsula was claimed. The UN commission on the Limits of the Continental Shelf (CLCS) is empowered to make decisions on extensions of the continental shelf, which would be to extend the 200 kilometer exclusive economic zone (EEZ). In 2001, Russia's approached the CLCS to establish its first legal claim, where, if it were successful would entitle Russia to 45 percent of the Arctic (Kefferpütz, 2010). However in 2008, Russia had released a less aggressive arctic strategy, where it emphasizes that in order for its country to stay current in world affairs- Russia must be involved in its Arctic development. Russia is determined to stake its claim and increase its sovereignty in the Arctic (Manicom, 2011).

The United States Stance on Sovereignty for the Northwest Passage

From the United States point of view, it is their belief that the Northwest Passage should hold the status of an international straight, which means a "straight used for international navigation" (p. 148). Johnston (2002) states this came from "Article 37 of the 1982 UN convention on the law of the sea" (p. 148).

However since there is infrequent shipping traffic in the area, which is publically recorded, this does not allow for the Northwest Passage to be simply classified as an international straight. Today it is more common to receive consent from Canada to use the passage. This reinforces that it is not an international straight, since consent is required. Since 1988, there is an "Agreement on Arctic Cooperation" between the United States and Canada, states Johnston (2002, p. 148). This agreement is such that, the United States and Canada are to share icebreaking services. Although, by Canada not entirely managing the aspects of the Northwest Passage, other countries could perceive this as another decline in Canada's sovereignty. Currently there seems that little interest between Canada and the United States to press the matters further by taking it to international adjudication (Johnston, 2002). According to Weir (2009), the US has begun of late to recognize waking up the Arctic possibilities by challenging Canada's sovereignty.

Denmark Direct Competition for Canada's Arctic Sovereignty

Due to that fact that Demark owns Greenland, this puts Demark as Canada's second closest neighbor, next to the United States (Byers, 2009). In 1973, it was agreed by Canada and Demark to divide the continental shelf between Canada and Denmark down the Middle, which is the same line that divides their fishing boundaries. It is this line that runs through the center of Hans Island. Therefore, Hans Island, Denmark and Canada both have a dispute with the claim of a small rocky outcrop, which is between Ellesmere Island and Greenland (Byers, 2009). Consequently, whichever country wins this dispute will have say in who visits Hans Island, and what activities can take place there. Demark has the same stance as any other Country, that boarders the Arctic. Demark is hopeful to gather evidence that will supports its claim over the ocean bordering Greenland (Holmes, 2008). Byers (2009) states, that in 2008, Denmark hosted a summit, that took place in Greenland, this was for five Arctic countries that border the Arctic to affirm their commitments which include, Arctic law, and scientific mechanisms for establishing claim of continental shelves.

Norway's Stance on Arctic Sovereignty

Other than Russia, Norway was the only other country to file a legal claim that would extend its continental shelf that would reach into a part of the Arctic (Holmes, 2008). However, overall Norway does not come across as very aggressive towards pursuing ownership of the Arctic seabed, this is largely due to Norway previously admitting that it does not have a continental shelf that extends as far as the North Pole. Conversely, there is a suggestion that if Russia and Norway can come to a mutual agreement on Russia's claim that the Continental Shelf Commission would be more likely to validate both claims. Therefore, Norway did concede, that it was negotiating with Russia to submit a unilateral claim. Therefore, at this time both Russia and Norway seemed to be on good negotiation terms; however, as more countries enter aggressive pursuits of the Arctic, pleasant negotiations are more likely to break down, and this will test the United Nations Convention Law of the Sea (UNCLOS) framework (Holmes, 2008).

Canada's approach to maintaining its Arctic Sovereignty

First, before the Northwestern Passage is established it first has to be deemed useful, not just characterized to have potential use, which is its current standing. Although, if the number of vessels increases along this route, without seeking Canada's permission, the legal status Canada has over this claim can be challenged; where, this passage could be declared an international passage. Overall, this would limit Canada's ability to govern the marine shipping practices; and, there is potential that the International Maritime Organization would take over (IMO). The main way to prevent this, is to have the Canadian Government's presence in this region, where it should be reinforcing Canada's sovereign claim. It is argued that with the vast amount of territory it has in its North, that Canada lacks the resources to

enforce its governance over this region. However, Canada does possess some strategic capabilities- where it operates a fleet of five icebreakers in the region- which guide foreign vessels. There is the Canadian Forces Northern Area (CFNA), which is composed of 65 regular forces and operates out of Yellowknife. Also, the Canadian Ranger Patrol Group works with the CFNA to assert a military presence in the North. Through the North American Aerospace Defense Command (NORAD), Canada has a number of unmanned radar sites. This North Warning System (NWS), provides North America with surveillance of the Arctic Territory. These combined efforts allow Canada to establish a presence in the Arctic (Carnaghan & Goody, 2006).

Major movements towards Sovereignty

There would need to be a fair and equal distribution of resources in the Arctic, with there being an estimated 13 percent of the world's oil reserve and 30 percent of world's natural gas. Whereas, there was a United States geological survey conducted in 2008 that estimates there is around 90 billion barrels of oil hidden within the Arctic continental shelves (Manicom, 2011). Also, it is said by Manicom (2011), that most of these resources are within the undisputed areas near the shorelines (p. 335). Each states national sovereignty needs to be considered, which could be a partial jurisdiction that would be granted over the Arctic continental shelf and this would be relevant as a domestically political issue. Internationally legal presences attempt to balance these issues through lengthy litigations that are geared towards fostering cooperation between neighboring states. Each state attempts to put in their own efforts to work towards solutions for managing and controlling the arctic waters effectively. Canada and Russia are recorded as being very involved in researching the Arctic seabed. In Canada, this was demonstrated in 2008 when the Harper government announced that it would be undertaking a geo-mapping expedition to exploit natural resources that were previously hidden under ice and tundra. Whereas, the secretary of Russia's Security Council, Nikolay Pastrushev insists that the Arctic must be awarded to Russia for its future security. Following similar steps as to the approach that East Asia took with determining its maritime boundaries, this could reduce obstacles in creating policy. It is important to bring the oppositions to a cooperative negotiations, as well as multilateral confidence building, to reduce the animosity between the parties. An important first step would be to develop mapping between Canada, Russia, and Denmark. There have been efforts between Canada and Denmark to coordinate coast guard patrols of the Arctic, by simulating search and rescue missions. Canada holds an annual military exercise in the north and in 2010 United States and Danish forces joined the exercise, where Russia failed to participate. This could be due to Russia's media fostering an ongoing fear that there is a collaboration of oppositions towards Russia's claim on Arctic territory, which Russia's media feels is from Western Arctic countries (Manicom, 2011). Nevertheless, there needs to be clear policies in place to clarify Arctic boundaries. These have to be fair and equal to prevent resource wars from developing.

Effects on Major Canal Routes

Canada's Northwestern Passage and Russia's Northern sea route eventually will directly compete with the current Suez and Panama Canal- which it is proposed to cut shipping travel times from Asia to Europe in half for four months or more in the summer. Schøyen and Bråthen (2011) estimate that the NSR are an approximate 40 percent shorter distance; where, Andrea Charron (2005) states that this route would be approximately 7000 kilometers shorter between Europe and Asia, when compared to the current route that is available through the Panama Canal. The new routes can save on time, fuel, reduce emissions, promote more trade, and reduce the pressures on the nearly over capacitated current routes (Howard, 2009). However, even though emissions will be reduced due to shorter travel times, new emissions will be redistributed in the Arctic, where the ozone is far more sensitive to global warming. The amount of freight is currently growing at about 6 percent per year; which, it is proposed that the capacity will be at its maximum for the Suez and Panama Canal by the middle of this century. This allows for some of the

excess capacity to be redistributed through the availability of the Northern Passages. Overall, it is estimated that taking the Northeastern Route can result in an average of 15 percent lower yearly costs (Khon, Mokhov, Latif, Semenov, & Park, 2010).

Shipping Companies Perspective on the Northern Shipping Passages

Not all companies are in agreement with moving their shipping routes to the north, and this was demonstrated when a poll was taken. Different firms were divided by different regions, such as: Europe, North America, and Asia; and, even further by different sectors activities: container shipments, roll-on roll-off, bulk, general cargo and specialty cargo. Of the companies that have expressed interest in the Arctic, eight already have a presence in the Arctic, three of these are in the bulk sector and the other 5 are in the general cargo sector. Altogether a total of 17 companies expressed interest in Arctic shipping routes, according to a study conducted by Lasserre (2010), with 10 of these being from Europe and the other 7 from North America. This was out of a total of 98 possible shipping companies. Those that expressed no interest, indicated that this was due to a lack of port facilities and navigation services, mainly on the Canadian side. Other concerns were the conditions of the routes, mainly risks posed by growlers or smaller icebergs. These would cause a ship to reduce its speed below a limit that would be beneficial to saving time or fuel costs. Along with icebergs, fog, and poor visibility, these would lead to an increased risk of accidents. All these aspects would make insurance and other sources of risk mitigation not only difficult to attain, but also, the expenses may exceed the benefits (Lasserre & Pelletier, 2011).

Infrastructure and Physical Requirements

For each Arctic passage there would have to be clear lines developed so that ships can travel on a regular basis. When it is established who is responsible for each area, ships would have to be able to receive assistance when needed, within a minimal time frame, even if this includes replacement ships (Verny & Grigentin, 2009). Each ship that is operated in the Arctic must have reinforced hauls to withstand impact and friction from coming in contact with ice. As the reduction of pack ice accelerates over time, these reinforced hauls will be less compulsory (Verny & Grigentin, 2009). Also, vessels in the Arctic should have access to technology that provides a synoptic environmental observation that includes: weather, sea, and ice condition forecasts. This type of equipment can mitigate risk by providing strategic or tactical navigational support. There will need to be a collaborative effort of meteorological, environmental monitoring, oceanographic, and sea ice data and forecasting capabilities, to provide vessels with valid routing information. Included in these efforts would be an increase in ice-breakers and search and rescue vessels services. There will have to be ship captains that have Arctic experience and can facilitate training shipping companies. As shipping traffic gets heavier, the routes will require monitoring by implementing a vessel traffic system (VTS), which is already utilized in the Barents Strait. Finally, there will need to be a mutually agreed governance or regulation framework in place, which could be based on the Nations Convention on the Law of the Sea (Ho, 2010).

The Impact of Arctic Routes on Supply Chain Management and Risk

Currently there is little slack in the supply chain to cope with unforeseeable risks. New routes can help to deal with disruption, delays, and unpredictable weather. However, the challenges with navigating the NSR are seen to be three times riskier than taking the southern passages, such as, the Suez Canal passage. Part of this, is due to the lack of current data and monitoring or the NSR. The variation in season for the NSR, where there are times that they are inaccessible due to ice, and where Russia and Canada stand with their policy and infrastructure, seem to remain uncertain at this point (Schøyen & Bråthen, 2011). It is proposed by Binkley (2014), that shipping traffic in the Arctic is proposed to increase about six times.

Whereas, the Canadian federal government cannot ensure that vessels can navigate the Arctic and be able to receive emergency response in a timely fashion (Binkley, 2014). It is said by Binkley (2014) that, the federal government lacks a strategy that would support safe passageway through the Northwestern Passage. However, the Canadian government does have a Northern Strategy, but it does not have a vision for marine transportation. The provision that needs to be developed has to meet the different challenges that Arctic marine shipping poses. Mainly, there is a shortage of icebreaking, physical aids for navigations, marine charts, and reports on ice conditions. These are great concerns for safe navigations as the level of shipping increases (Binkley, 2014).

Cost Savings

Although, cost savings will not be absolutely certain until more studies are conducted on ships using the NSP, there have been some positive theories developed. Schøyen and Bråthen (2011) point out that, even though the NSR may be a significantly shorter distance, this can be seen as a cost saving in two ways. Firstly, where the time in days in reduced by approximately 12 days or secondly, where the time remains the same but the speed is reduced. Fuel consumption can be correlated to the speed that is traveled, and by taking the NSR, speed can be reduced from an average of 15 knots to 9 knots and the travel time will remain the same. This can translate to an approximate fuel cost saving of 22 percent. Although the best way to reduce the greenhouse gases with shipping would be to reduce shipping speeds and overall fuel consumption. There was a recent voyage conducted by Nordic Bulk Carriers in September 2013, which was the first commercial vessel to navigate the Northwest Passage. This was successful with the use of the *Nordic Orion,* which is a 1A ice-class ship. The voyage was from the port of Vancouver to Baffin Bay, where the cargo was metal logical coal, and the *Nordic Orion* was at full capacity. The alternative route would have been via the Panama Canal. It was noted that, by use of the Northwest Passage, the travel was a 1000 nautical miles less, which totaled a four to five day sailing time saving. Not only was there a saving in time, there was also a substantial reduction in CO_2 emissions, with there being an estimated 800 to 1000 tonnes less fuel consumed at $600 USD per tonne. Moreover, there would have been an additional $175,000 Panama fee. Additionally, the Panama Canal is shallow when compared to the Northwest Passage, this allowed the *Nordic Orin* to increase its carry capacity by 25 percent (Cardwell, 2013). Gedeon (2013) points out that even with an estimated additional 100,000 dollars in insurance costs, overall, this voyage resulted in a reduction in cost.

Conclusion

In conclusion, there is still a lot that needs to be resolved regarding ownership over the Northern Shipping Passages. There are numerous disputes still taking place to declare ownership of it. The research has found that there is a lack of study in respect to the Canada's Northwest Passage. Whereas, Russia has numerous aggressive studies conducted on the prospects of their NSR. Russia has also developed more infrastructure for successful voyages to take place in the NSR. Canada also has to compete with its near neighbors United States and Denmark for ownership. Currently, Canada has a lot to undertake in order to make Canada's Northwest Shipping a possibility in the near future, which is mainly to increase the documentation regarding ownership, development of infrastructure and navigational patrols, and develop a strong presence in the Arctic. This research has demonstrated, that there is a significant prospect for cost reduction in marine shipping. Further research needs to take place on the Northwest Passage, to test the hypotheses that long term use of the Northwest Shipping Passages will outweigh the initial infrastructure investments.

References

Binkley, A. (2014). Federal Government Falling Beind in the Arctic. *Arctic Shipping Special Report*, 12-13.

Byers, M. (2009). *Understanding the Sovereignty Disputes in the North: Who Owns the Arctic*. Quebec: Access Copyright.

Cardwell, M. (2013). First Commercial Vessel Transits Northwest Passage. *Arctic Shipping Special Report*, 9-10.

Carnaghan, M., & Goody, A. (2006). Canadian Arctic Sovereignty. *Parliament of Information and Research*, 1-10.

Charron, A. (2005). The Northwest Passage Shipping Channel: Sovereignty First and Foremost and Sovereinty to the Side. *Jounal of Military and Strategic Study, 7*(4), 1-26.

Gedeon, J. (2013). Receding Ice Pushes Canada Towards New Environmental and Economic Realities. *Arctic Shipping Special Report*, 6-8.

Ho, J. (2010). The Implications of Arctic Sea Ice Decline on Shipping. *Marine Policy*, 713-715. doi:10.1016/j.marpol.2009.10.009

Holmes, S. (2008). Breaking the Ice: Emerging Legal Issues in Arctic Sovereignty. *Chicago Journal of International Law*, 323-351.

Howard, R. (2009). Climate Change and the Arctic. *The World Today*, 12, 13.

Johnston, D. M. (2002). The Northwest Passage Revisited. *Ocean Development & International Law*, 145-164. doi:10.1080/00908320290054747

Kefferpütz , R. (2010). CEPS Policy Brief. *On Thin Ice? (Mis)interpreting Russian Policy in the High North*, 1-10. Retrieved from http://www.ceps.eu/book/thin-ice-misinterpreting-russian-policy-high-north

Khon , V. C., Mokhov, I. I., Latif, M., Semenov , V. A., & Park, W. (2010). Prospectives of Northern Sea Route and Northwest Passage in the Twenty-First Century. *Climate Change*, 757-768. doi:10.1007/s10584-009-9683-2

Lasserre , F., & Pelletier, S. (2011). Polar Super Seaways? Maritime Transport in the Arctic: an Analysis of Shipowners' Intentions. *The Journal of Transport Geography* , 1465-1473.

Lasserre, F. (2011). Arctic Shipping Routes: From the Panama Myth to Reality. *International Journal*, 793-808.

Liu , M., & Kronbak, J. (2010). The Potential Economic Viability of using the Northern Sea Route (NSR) as an Alternative Route Between Asia and Europe. *Journal of Transport Geography*, 434-444.

Manicom, J. (2011). Maritime Boundary Disputes in East Asia: Lessons for the Arctic. *Balsillie School of Interntional Affairs*, 237-340.

Rothwell, D. R. (1993). *The Canadian-U.S. Northwest Passage Dispute: A Reassessment.* Cornell Int'L.J.

Schøyen , H., & Bråthen, S. (2011). The Northern Sea Route Versus the Suez Canal: Cases from Bulk Shipping. *Journal of Transport Geography*, 977-983.

The Roar of Ice Cracking. (2013). *Outsiders in the the Arctic*, 49-50.

Verny, J., & Grigentin, C. (2009). Container shipping on the Northern Sea Route. *Int. J. Production Economics*, 107-117.

Weir, F. (2009). Global Warming Opens New Arctic Shipping Lane. *The Chirstian Science Monitor*, 11.