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Real Options for Long-Term Harbor Infractructure Investment Decisions

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Structure of the presentation

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- Real option theory
- Research Methodology
- Research Environment
- Case study: Real option study in the infrastructure of Selected Finnish Ports
- Discussion and conclusions

Research Questions

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1. What should seaports consider in their strategic decisions in the seaport infrastructure investments and what is the role of society (public sector) in these decisions?
2. Which real options can be used in seaport infrastructure investments, and which are the most recommended to each seaport?
3. Is it possible to get savings in extra capacity cost with outsourcing and co-operation of ports?

Real option theory

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- Discounted Cash Flow (DCF) methodology is basement for Real option theory: SNPV = NPV + R
- An investment can be accepted although its NPV is negative (NPV<0 if R>0 and SNA>0).
- When using real options continuous follow-ups of the operational environment are required: Information must be collected, updated and analyzed.
- Based on that information, decision-makers try to reduce uncertainty and make better decisions using investment flexibility by holding over, expanding, refusing, reducing, or in another way changing the operating strategy in order to increase incomes or reduce losses.

Real option alternatives

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- *Option to defer:* With the defer option an investor seeks for more information about markets, rivals, legislation and future to get the best timing for an investment.
- *Option to abadon:* An investment or operation can be rejected definitely if it seems to be unprofitable.
- *Staged investment (time-to build)* makes it possible to realize investment for a long run as the need arises (demand of markets).
- *Option to alter oprating scale* generally means the cutting of extra capacity in handling operations, labor or warehouse capacity in harbors.
- *Growth option* has strategy expectation value that effects the future growth and good profitability expectation.
- *Multible interacting options* are available all at once in an interacting combination.

Research Methodology

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- This study used a case research method.
- The data of each seaport has been collected by interviewing port staff, examining web-pages and other published second hand material in Stoca project.
- These interviews have been made and the minutes confirmed together with port staff.
- The data from interviews are generally qualitative and channel research to the qualitative direction.
- This way the case study context allows a deep understanding of each port: its operation system and environment as well as potential opportunities and risks.

Research Environment 1/3

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- The research environment consists of the following Finnish ports: Naantali, Vuosaari (Helsinki), Kotka and Hamina, and their related logistics infrastructure such as shipping lines, quays, ware fields and houses, and all devices that are needed in handling operations of harbors.
- During the last years large amounts of investments were made in the Finnish seaports, but after year 2008 the worldwide recession made these investments risky.

Research environment 2/3
The Gulf of Finland

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Research environment 3/3: The factor that weigh to the future development of the Finnish ports

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- The development of the ports of Hamina, Vuosaari, Kotka and Naantali is depending on several factors:

1. The development of economy in the world and in the shores of the Gulf of Finland, especially in Russia.
2. The future role of Russia's own ports in the Gulf of Finland.
3. The other ports in the Gulf of Finland, especially Estonian ports like Sillamäe, Muuga and Paldinski.
4. The other ports in the Baltic Sea region in Poland, Lithuania, Latvia, Denmark, Sweden and Germany.
5. New transportation routes to Russia (see next slide).

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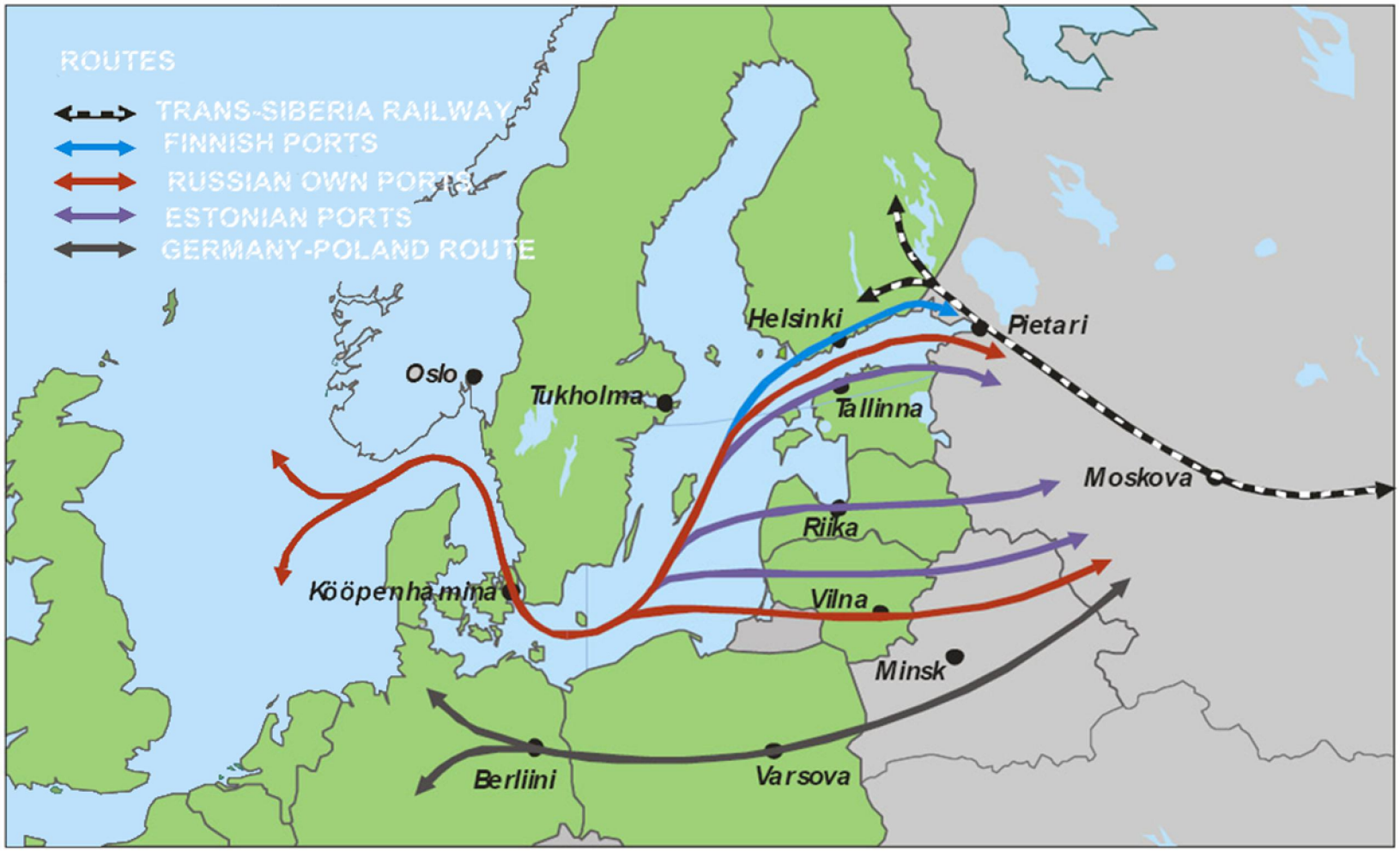
Tranportation routes between EU and Russia



The Port of Naantali

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- The municipally-owned port of Naantali is specialized in ro-ro/ ropax and oil transportation.
- In 2008 Naantali was the second largest truck and trailer port in Finland with 2 844 143 tons and with 163 815 trucks or trailers.
- Naantali has a significant position in Finland's Scandinavian freight traffic and Åland freight service.
- The oil transportation is limited to 4 million tons because of the capacity of the Naantali oil refinery.
- Investments in the basic port infrastructure in Naantali will be large in the near future; a new two level ro-ro quay will cost 6-9 million euro, and the deep-waterway (15.3 meter) investment, needed in oil shipping, will require 4-5 million euro.

The port of Naantali

The Port of Vuosaari (Helsinki)

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- The municipally-owned brand new port of Vuosaari (Helsinki) is the most significant ro-ro and container port in Finland: About one third of the value of all Finnish import and export is handled via the port of Vuosaari
- The terminal was planned to serve flexible ro-ro and container shipping with 750 meter long container quays and with 15 ro-ro berths.
- The motorway and railway connection starts from the harbour, and there are eight tracks in the terminal area, and some warehouses with a railway connection
- Vuosaari has regular connections to the ports of Germany, Estonia, Netherlands and Great Britain.
- Vuosaari is a brand-new harbour, and it has no investment plans for the near future

The port of Vuosaari

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The Port of Kotka

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- The municipally-owned port of Kotka is very significant container (capacity 1 million TEU) and transit transportation port in Finland
- More than a third of the freight transportation was delivered in containers via the port of Kotka which was the first container port in Finland (1989)
- Transformability is the basis for developing and building anything new in the port of Kotka.
- Kotka is also a significant export and transit port that offers direct connections to Germany, Great Britain, Holland, Belgium, Estonia and other European oceanic ports.
- In the year 2009 a new quay for gas pipes and a concrete department for the gas pipes were built. Palaslahti area (150 ha) is reserved for future logistics investments as well as for ware sheds, railway, loading and unloading constructions

Port of Kotka

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The Port of Hamina

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- The municipally-owned port of Hamina lies only 35 km from the Russian border: nearly 20 % of the Russian transit transportation is handled via the port of Hamina.
- Hamina is specialized in handling liquid bulk, gas and containers
- A large logistics warehouses network is located in the harbor and by the side of the road to the Russian border.
- As the dredging work of the shipping channel and dock to 12 meters deep are ready at the end of year 2010, up to 70.000 DWT vessels will arrive in the harbour.

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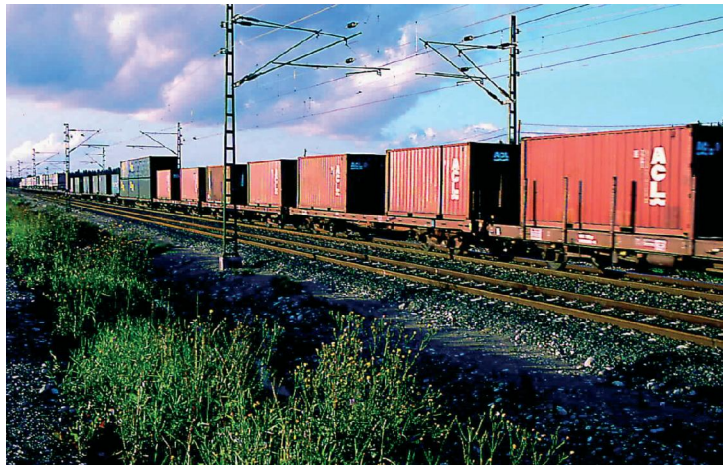
Port of Hamina



Infrastructure of the ports 1/2

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Port	**Land area** (ha)	**Depth of Channel** (m)	**Length/ Quays** (m)	**Number of ro-roramp** (each)	**Number of lo-lo piers** (each)	**Number of oil and Chemical piers** (each)	**Other Piers** (each)	**Storage area in warehouses** (sqm)	**Rails** (m)
Hamina	461	10	2 978	7	24	4	0	**384 000**	**37 050**
Helsinki	168	11	9 009	29	9	0	18	40 000	12 000
Kotka	624	15	5 214	11	23	2	2	**519 000**	**39 100**
Naantali	24	13	1 282	3	6	4	0	5 723	3 325
Total	1 277	49	18 483	50	62	10	20	948 723	91 475

Infrastructure of the ports 2/2

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Port	Number of cranes			Mobile goods handling equipment	
	Container cranes (each)	**Other cranes** (each)	**Ship unloaders** (each)	**Owned by the port** (each)	**Private** (each)
Hamina	3	1	0	0	90
Helsinki	10	2	0	0	235
Kotka	0	6	1	6	0
Naantali	0	2	2	0	16
Total	13	11	3	6	341

Case study: Real option study in the infrastructure of Selected Ports

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- Factors that contributed to investment decisions in seaports:
- The ports of Hamina, Vuosaari, Kotka and Naantali handle the major share of Finnish foreign trade and transit.
- Investments in the basic port infrastructure construct the basis of success. (Society and local actors have invested the most in Finland).
- Globalization has brought worldwide actors which have also invested in the logistics systems and terminal infractructure of sea ports.
- In time new transportation routes can also make more or less permanent changes to the ports' rankings, e.g. Russia aims at gaining self-sufficiency in logistics by structuring its own sea ports and logistics infrastructure.

Option Review in the Ports of Naantali, Vuosaari (Helsinki), Kotka and Hamina

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- For the brand-new Vuosaari harbor the option to defer will be the most significant real option right now. However, in the future growth options will be available in the development work of operation capability when responding to future needs.
- For the Naantali harbor the recommended real option will be the growth option because the port of Naantali has specialized in ro-ro transport which has decreased less than container transportation during recent recession.
- For the Kotka harbor the most recommended option will be to switch use: the harbor should get new operations as well as new warehouses and ware fields, such as concrete department for the gas pipes in the existing warehouse, and new development work for advanced logistics services to the shippers and customers. Also the option to alter the operating scale.
- For the Hamina harbor the most recommended option will be to switch use: the harbour should specialize in handling transit transportation as well as Russian liquid bulk and containers.

Extra capacity study of seaport infrastructure

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- Naantali, Vuosaari (Helsinki), Kotka and Hamina harbors are compared from the viewpoint of the ports compensating each others' operations with the existing port infrastructure.
- Harbors have generally 30-65 per cent overcapacity and a flexible operation system allows even more amounts of handling in harbor if the harbor is open 24 hours per day. In addition, there are a large amount of warehouses in a setting in Kymeenlaakso region. For that reason Hamina harbor can substitute for Kotka harbor and vice versa.
- Therefore the ports only need a powerful cargo handling system with good road or railway connections to the logistics centers, warehouses and fields.
- Only liquid bulk and oil handling cannot be compensated, if nearby harbor hasn't special tanks for liquid bulk or oil.
- So extra capacity costs can be saved in warehouses and fields with outsourcing and co-operation with other ports and logistics centers.

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Export, import and total in transit in 2008

	Exports				Imports				Total
	Bulk		General cargo	Total	Bulk		General cargo	Total	
PORT	Liquid bulk (ton)	Dry bulk (ton)	(ton)	(ton)	Liquid bulk (ton)	Dry bulk (ton)	(ton)	(ton)	Imports/ exports total (ton)
Hamina	988 659	0	70 331	1 058 990	0	0	612 798	612 798	1 671 788
Helsinki	0	0	0	93 420	0	0	0	233 744	327 164
Kotka	725 478	449 759	0	1 175 237	0	0	2 178 721	2 178 721	3 353 958
	0	0	0	0	0	0	0	0	0
Total	1 714 137	449 759	70 331	2 327 647	0	0	2 791 519	3 025 263	5 025 746

Discussion and conclusions

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- The rapid chancing and uncertain future has made investments in the seaports very risky because the financial expectations of the ports have weakened during the current recession.
- Harbour investments decisions are generally dependent on new future forecasts of the operation environment and the capacity in a specific harbour.
- Furthermore, the financial position of the harbors and the financial support received by the Finnish society weight heavily in the scale and timing of these investments.
- The real option method emphasizes activity and capability of the decision makers; how they follow markets, technology and their competitors
- Real optio method gives needed flexibility in investment decisions. Also operational

Recommended real options

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- The most recommended option for each harbors:
- For the port of Hamina is to switch use: Hamina should develop new and existing operations. Transit transportation to Russia by railways should potential development area.
- For the port of Kotka is switch use: Kotka should get new operations in the harbor, its warehouses and ware fields. Concentration on containers, transit and co-operation with industry and importers should be potential areas.
- For the port of Vuosaari the option to defer is the most significant real option
- For the port of the growth option for basic port infrastructure is recommended.
- Extra capacity costs can be saved in warehouses, fields and handling devices with harbors' co-operation and outsourcing. Also the risks to each harbour are limited when the need of equity is reduced.
- The next trend for seaports will be concentration and focusing in the Baltic Sea region and the amount of seaports become less.

Thank you!

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