Socio-economic Expert Roundtable

Plan4Blue Project: the socio-economic work package.

Economic potential of maritime regions: research framework and preliminary results in the case EST-FIN border regions

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Data and Methodology

1. Estonia (EST) and Finland (FI) as well as OECD **input-output (I-O) tables**. Input–Output (IO) methodology explores the linkages and production effects of the Estonian and Finnish marine sectors on the national economies and cross-border cooperation.

Marine sectors/products in I-O tables:

- Estonia. Fish and other fishing **products;** aquaculture products and Water Transport.
- Finland. Fishing and Water Transport **industries.**

How maritime economies are interlinked with national economies of Finland and Estonia?

2. **AMADEUS (EST) and ORBIS (FIN) microdata.** Descriptive statistics, productivity and efficiency of blue sectors. How productive and efficient are blue economy sectors in marintime regions?

1. Input-Output (I-O) tables based analysis: Preliminary Results

- The situation is in general similar in both countries, Estonia and Finland.

- The **forward linkage** effects of the maritime sectors/products are lower than those of other sectors/products, which means that **when economic activities are booming the maritime sectors are less stimulated by overall industrial growth than other sectors. Maritime sector is not so much influenced much by business fluctuations of national economies.**

- The **backward linkage** effects of maritime sectors are also lower than those of other sectors/products. Thus, **maritime sectors have smaller impacts in terms of investment expenditures on the national economy than other sectors.**

Discussion: why backward and forward linkages of maritime sectors are comparatively weak?

- **Maritime sectors in Estonia and Finland are rather independent in their development within national economies? Is it so?**

  - Previous literature (see *Marine Policy* journal papers 2005 (Korea study) and 2016 (Ireland study) found more strong evidence of maritime sectors linkages with national economics.

- **Statistical problem:** Input – Output (I-O tables) statistics and methodology are still rather weakly developed for analysing linkages between these sectors and consequently, also for elaborating proposals improving cross-border cooperation. Thus, I-O statistics statistics has to be improved. (E.g. *Garbage in, garbage out….*)

2. ANALYSIS OF ECONOMIC POTENTIAL OF BLUE ECONOMIES in Estonia and Finland: RESEARCH METHODOLOGY

Economic potential analysis

1. Productivity analysis

How much output is produced per unit of input (resource)?

Method: crude partial productivity measures (single output w.r.t. single output; no benchmark comparison)

2. Efficiency analysis

How efficiently resources are utilized? Efficiency refers to maximization of output given inputs

Method: Data Envelopment Analysis (multiple inputs w.r.t. multiple outputs; benchmark comparison)
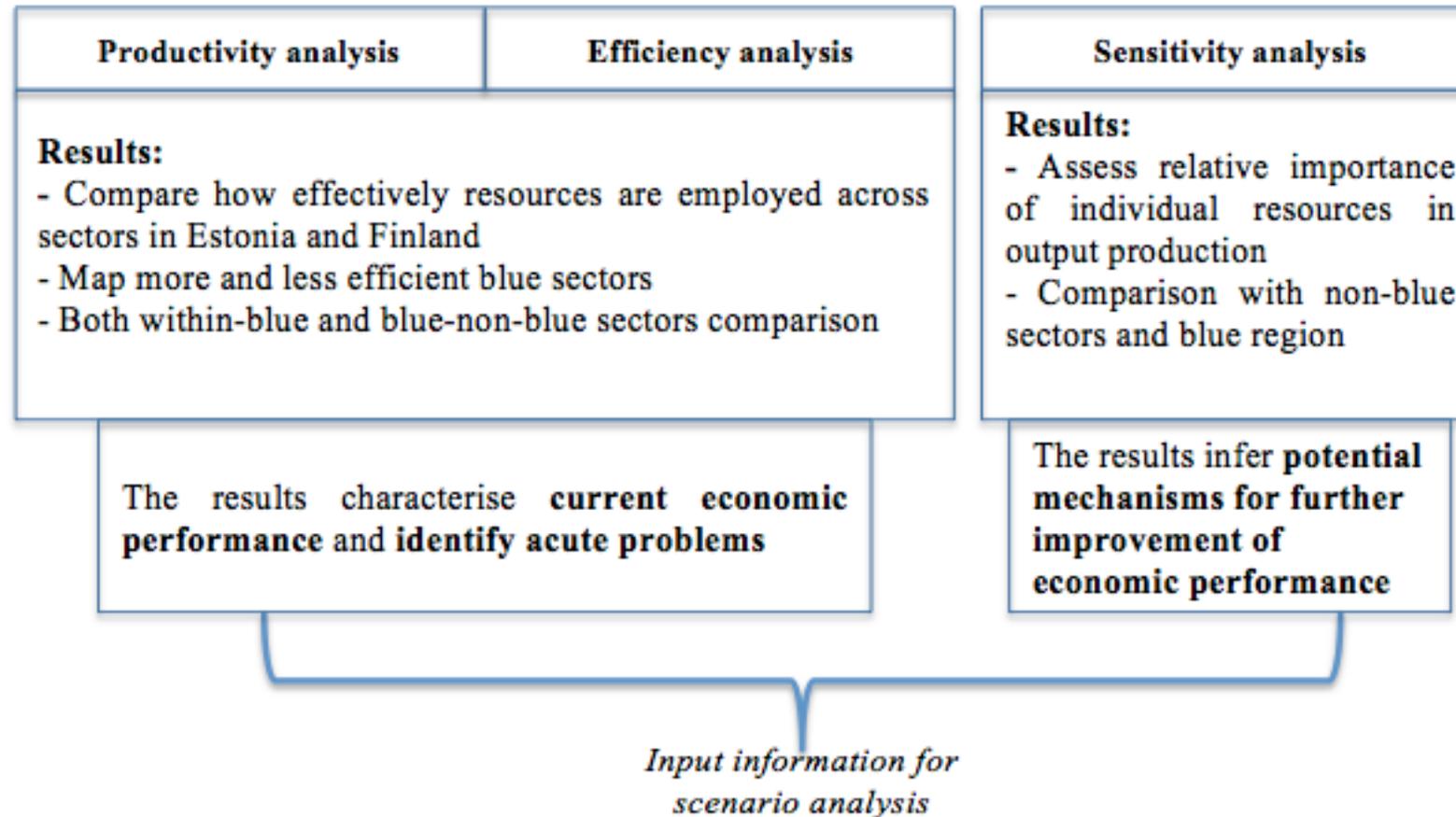
3. Sensitivity analysis

How variation in input quantity affects output? What will happen to output if to increase input(s) by 1 unit?

Method: regression analysis (single output w.r.t. multiple inputs and related factors potentially affecting output)

Expected results and their conjunction with other Project tasks:

Productivity analysis	Efficiency analysis	Sensitivity analysis
Results: - Compare how effectively resources are employed across sectors in Estonia and Finland - Map more and less efficient blue sectors - Both within-blue and blue-non-blue sectors comparison		**Results:** - Assess relative importance of individual resources in output production - Comparison with non-blue sectors and blue region
The results characterise **current economic performance** and **identify acute problems**		The results infer **potential mechanisms for further improvement of economic performance**

Input information for scenario analysis

Inputs and Outputs of economic activities

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We choose 6 financial indicators (3 for inputs and 3 for outputs) :

Inputs (resources)	Outputs (outcomes)
Total current assets	Turnover
Total fixed assets	Gross sales
Number of employees, as a proxy for total employee expenditures	Profit/loss after tax

Blue industries' and blue region sample

Data source: **Amadeus database.**

All companies are traced for up to years prior to last year observed (varied from 2013 to 2016). To minimize heterogeneity of estimates, we extract a data for year 2015 for all Estonian and Finnish firms *(note: majority of firms last reported in 2015)*

Region

1) Estonia: all municipalities of Harju, Ida-Viru and Lääne-Viru counties (Lääne county is excluded, as we observe only 1 blue company in Nõva, Noarootsi and Vormsi municipalities).

2) Finland: Kymenlaakso, Uusimaa, Finland Proper counties.

Company size limitations:

- More than one employee (e.g. majority of fishing companies have only one empyee in Estonia)

- More than 1000 EUR turnover in last year observed

Blue industries

Industries (NACE Rev. 2)

- **Maritime fishing and aquaculture** (0311 - Marine fishing, 0321 - Marine aquaculture)

- **Energy** (06 - Extraction of crude petroleum and natural gas, 091 - Support activities for petroleum and natural gas extraction, 19 - Manufacture of coke and refined petroleum products, 2011 - Manufacture of industrial gases, 351 - Electric power generation, transmission and distribution, 3513 - Distribution of electricity, 352 - Manufacture of gas; distribution of gaseous fuels through mains, 3522 - Distribution of gaseous fuels through mains, 4671 - Wholesale of solid, liquid and gaseous fuels and related products)

- **Shipping** (501 - Sea and coastal passenger water transport, 502 - Sea and coastal freight water transport)

- **Maritime tourism** (551 - Hotels and similar accommodation, 552 - Holiday and other short-stay accommodation, 553 - Camping grounds, recreational vehicle parks and trailer parks, 559 - Other accommodation, 561 - Restaurants and mobile food service activities, 563 - Beverage serving activities, 79 - Travel agency, tour operator reservation service and related activities, 932 - Amusement and recreation activities)

- **Maritime construction** (301 - Building of ships and boats, 3011 - Building of ships and floating structures, 3012 - Building of pleasure and sporting boats, 3315 - Repair and maintenance of ships and boats, 4291 - Construction of water projects).

Descriptive inference: blue industries as a part of blue region economy

Blue economy enterprises

Region	N total companies	N of blue companies	% of maritime sector
Estonia			
Harju	2957	206	7.0
Ida-Viru	194	15	7.7
Lääne-Viru	163	2	1.2
Finland			
Uusimaa	7102	368	5.2
Finland Proper	1618	101	6.2
Kymenlaakso	429	29	6.8

Source: Amadeus database.

Harju in Estonia and Uusimaa in Finland are the most blue-economy intensive regions.
This is quite expected as for capital counties.

Descriptive inference: blue industries as a part of blue region economy

Share of blue economy in regional inputs (resources):

Region	Total regional inputs			Blue sector % in total regional		
	Fixed assets, mln. EUR	Current assets, mln. EUR	Employees	Fixed assets	Current assets	Employees
Estonia						
Harju	9276.9	8451.4	129358.0	23.8	5.7	6.5
Ida-Viru	2007.8	639.5	14367.0	64.6	25.9	37.2
Lääne-Viru	646.6	416.8	9614.0	2.4	0.3	2.1
Finland						
Uusimaa	198306.9	173940.8	1245221.0	11.8	5.0	2.5
Finland Proper	8686.5	8456.9	93979.0	9.3	8.4	5.9
Kymenlaakso	3439.2	1289.5	14772.0	19.0	12.0	5.2

*Despite it constitutes only 8% of all firms in **Ida-Viru county**, blue economy accounts for 65% of fixed assets, 26 % of current assets and 37% of employees involved.*

*Reason: out of 15 blue enterprises, 10 are from **energy sector**, which is characterized by large stock of fixed assets and high labor demand.*

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Descriptive inference: blue industries as a part of blue region economy

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Composition of blue economy, within-industry inputs and outputs:

Estonia	Inputs (th. EUR)			Outputs (th. EUR)			
Sector	Current assets (C)	Fixed assets (F)	Employees (E)	Turnover (T)	Profit after tax (P)	Sales (S)	N
Bio and subsea activities	3922.4	8165.7	36	6689.3	2037.3	6154.8	9
Energy	8852.9	57545.6	125	41603.7	-1042.2	40644.7	59
Water transport	895.2	16735.8	16	3802.3	-92.3	3780.6	5
Coastal tourism	812.7	2056.6	52	3757.7	165.8	3720.2	128
Marine construction	1433.7	408.7	44	6100.7	234.1	6047.7	23
Finland							
Bio and subsea activities	1431	1949	10	4461	283	4920	12
Energy	113589	307474	184	376815	26784	421895	83
Water transport	8342	42305	96	30122	2413	31192	43
Coastal tourism	2342	2091	53	9200	136	9223	315
Marine construction	20287	2353	86	28029	-844	26447	45

Source: Amadeus database.

Energy sector in Estonia brings some interesting insights, as it involves the average largest fixed and current assets and highest number of employees (similarly to Finland), however, on average suffers losses (negatiive profit) .

In Finland only marine construction incurred on average losses in 2015.

4. Descriptive inference: blue industries as a part of blue region economy

Share of blue economy in regional outputs (value added):

Region	Total regional outputs			Blue sector % in total regional		
	Turnover, mln. EUR	Sales, mln. EUR	Profit after tax, mln. EUR	Turnover	Sales	Profit after tax
Estonia						
Harju	23034.3	22619.8	1148.9	9.5	9.6	10.8
Ida-Viru	1683.4	1616.9	-79.3	42.6	41.8	-.
Lääne-Viru	1150.4	1111.9	34.7	0.7	0.7	1.1
Finland						
Uusimaa	356145.6	346528.5	9891.2	9.4	9.4	15.3
Finland Proper	22262.0	21216.0	1354.4	7.6	7.7	4.6
Kymenlaakso	4159.3	3622.0	154.1	10.0	10.2	19.3

*In terms of outputs, **blue sectors are accounting for relatively high share of outputs in Harju, while in other Estonian regions blue economy is generating a share of profit lower than its actual share in the region** (due to energy sector) .*

*Ida-Viru is an interesting case, since blue industries are **unprofitable**, however, **achieve high operational returns (turnover) and sales volume**.*

Economic potential analysis: productivity assessment

Methodological approach: partial productivity measures to evaluate labor productivity

Partial productivity: ratio of one output to one input

Labor productivity measures are estimated relative to *three types of outcomes*. Here, as well as in the rest of analysis, outcomes of interest are **yearly turnover, sales and profit after tax.**

Motivation for this is twofold. Firstly, broader set of outcomes will give a more comprehensive picture of true productivity. Secondly, as we consider operationally different sectors, focusing on one single outcome may leave out important information and produce a biased picture of actual productivity.

Economic potential analysis: labour productivity assessment

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Labor productivity estimates cross-industry:

	Labor (L) productivity		
Sector	Turnover/L	Sales/L	Profit/L
Estonia			
Bio and subsea activities	292.90	222.84	104.16
Energy	2846.59	2832.44	80.36
Water transport	290.32	286.87	17.43
Tourism	174.58	172.85	5.28
Marine construction	372.18	366.85	12.58
Finland			
Bio and subsea activities	484.86	438.48	18.34
Energy	4574.47	4777.66	96.92
Water transport	698.41	400.46	20.32
Tourism	214.01	209.40	2.46
Marine construction	377.06	302.38	7.95

Estonia. On average, highest labour productivity is observed in **energy sector** *and also* **bio and subsea sectors.** *Hence, despite on average low profitability of blue energy sector in Estonia, it maintains high labour productivity. High profitability in bio and subsea sectors. Why?*

Finland. The highest productivity is also in **energy sector**, *the share of profit per employee is also observed the highest in energy sector comparing to other sectors.*

Less profitable regarding labor in both countries are tourism and marine construction.

Efficiency analysis

Methodological approach: Data Envelopment Analysis (DEA)

    Basic concepts:

    Efficiency – (simply) a ratio between inputs (resources) and outputs (results in monetary or physical terms)

    Effective business – achieves the greatest possible output per unit of inputs (i.e. state of absolute efficiency)

Several **benchmarks** for comparison:

1) Within-blue-sectors comparison for Estonia and Finland *(which industries are more efficient compared to other blue sectors)*

2) Blue-non-blue-sectors comparison for Estonia and Finland *(estimate blue industries' efficiency relative to non-blue sectors)*

Efficiency analysis: preliminary findings:

Within-blue-sector comparison

- When all 3 inputs and 3 outputs are taken into account, majority **blue sectors under observation appear to be efficient**, while in Estonia only water transportation is slightly less efficient than other blue industries.

Blue-non-blue-sector comparison:

- When comparing to non-blue sectors in the blue region, all **maritime industries remain 100% efficient in Finland**. In Estonia, similarly to previous benchmark, **only water transportation yields efficiency lower than 100%.**

In conclusion: questions for the presenter and collective brainstorming about....

- **What can we learn from this approach?** Maybe: a) Information on availability and quality of statistical information; proposals for improvement of statistical data (also cross-border statistics – hot topic in Eurostat now). b) Mapping economics activities in coastal regions; productivity and efficiency of blue sectors comparing to other sectors.

- **What is transferable to MSP reality?** Don't know yet!

- **What is useful for planners?** Don't know yet!

Thank you for your attention!