CONNECT2SMALLPORTS

Interreg South Baltic

EUROPEAN UNION

European Regional Development Fund

SMALL AND MIDDLE PORTS DIGITALIZATION AUDITING (EVALUATION) SYSTEM

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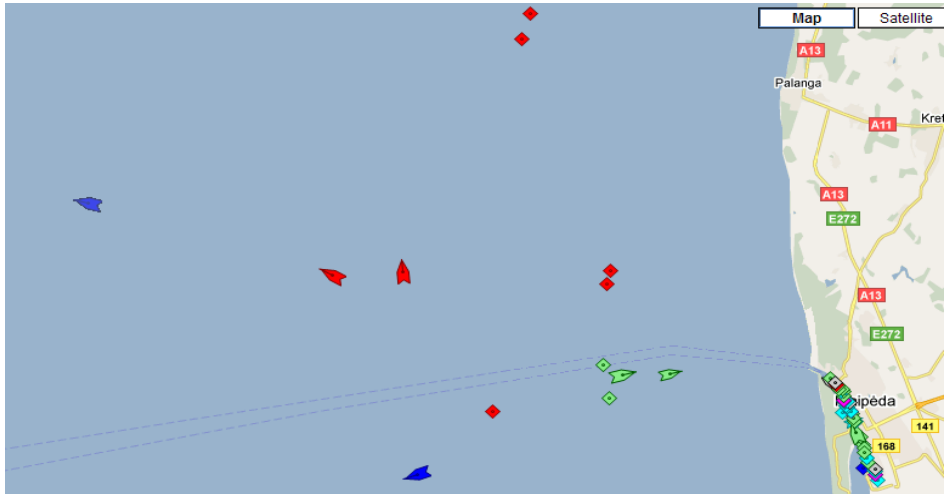
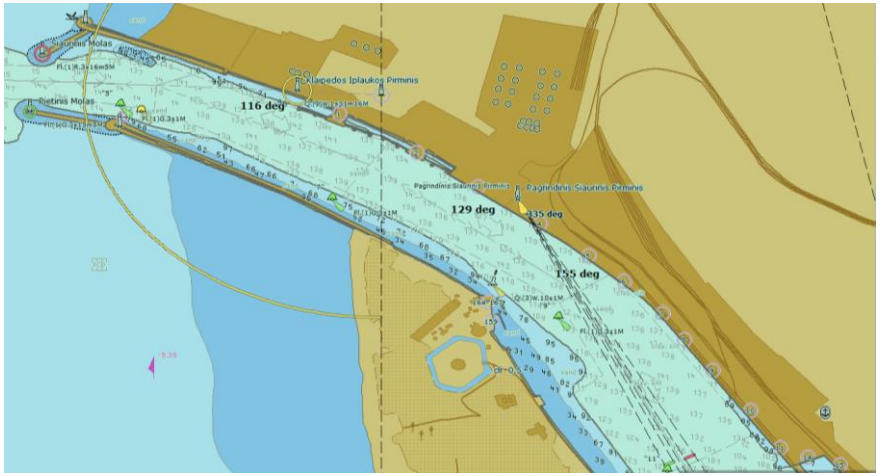
SMALL AND MIDDLE SIZE OF THE PORT

- Not core port in Baltic Sea
- Handling less than 10 million tons per year
- Specialized or non specialized
- Mainly municipality ports
- Limits of the activity and possibilities

DIGITALIZATION OF THE PORTS

- **Digitalization management functions**
- **Digitalization operations**
- **Digitalization services**





MAIN OBJECTIVES OF DIGITALIZATION

- Improve environmental and safety
- To make the best choice on best practice applications
- Apply the digital auditing tool in small and middle size ports
- Increase transport efficiency

DIGITALIZATION IN PORTS LIST

- 1. Navigation
- 2. Port surface
- 3. Ships in ports (as example “Laivas”)
- 4. Cargo in port (as example KIPIS)
- 5. People entrance to the port (ISPS code)
- 6. Emergency situation in port
- 7. ETA and ATA of the ships
- 8. Real (actual) depths in the port

DIGITALIZATION IN PORTS LIST

- 9. Legal documents valid in the port (port rules, navigational regulations and so on)
- 10. Public procurement
- 11. Port annual reports
- 12. Port statistics
- 13. Port development programs
- 16. Companies in port and its activities
- 17. Port control institutions
- 18. Port promotion materials (video, audio etc.)
- 21. Additional services in port
- 22. Port dues and tariffs, etc.

DIGITAL AUDITING BENCHMARKING METHODOLOGY

- **Main factors is taken as:**
- **digital readiness index for ports (DRIP), which have weight 60 %**
- **Extension for measuring the operating performance of ports (EMOPP), which have weight 40%.**

DRIP SUB-FACTORS

- **Management (20%);**
- **Human Capital (20 %);**
- **Functionality (IT) (25 %);**
- **Technology (30 %);**
- **Information (5 %).**

MATHEMATICAL BASIS (CONDITIONS) FOR THE BENCHMARKING

- Random factors (interviews)
- In case of big data of the random factors possible use Lepunov Central Theorem
- In case if possible use Lepunov Central Theorem it is possible use Normal (Gaussian) principal

“CODEBUCH” SYSTEM

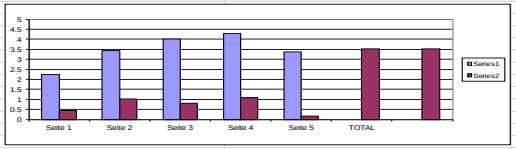
- Seite (Site) 1 cover Digital performance measurement Management and include 6 parameters, weight of this site as 0,2, because this site have very big influence on small port digitalization policy.
- Seite (Site) 2 cover technical IT elements such as: infrastructure, automation technology, data analytics, data security / communications security, development of / application of assistance systems, collaboration software as well non-technical skills such. Weight of the Site is taken as 0,35.
- Seite (Site) 3 cover Measurement Functionality and weight of the site is taken as 0,2, because site 3 very much depended of Site 1 and Site 2.

"CODEBUCH" SYSTEM

- **Seite (Site) 4 cover Smart Enterprise-Resource-Planning-System and include a lot of details, such as Smart Warehouse-Management-System, Smart Port-Community-System, Web-based Communication Platforms, Mobile Data Access for Employees, etc. Weight of this site is taken as 0,25.**
- **Seite (Site) 5 cover Personal Network, Printed Media, Internet, Social Media, Fairs, Conferences, Associations and Consultancies, Scientific Institutions. Weight of this Site is taken as 0,05.**
- **Seite (Site) 6 is included just for general information, because it is impossible benchmarking different ports in all, it is possible benchmarking concrete terminals.**

EXAMPLE OF THE PORT AUDITING

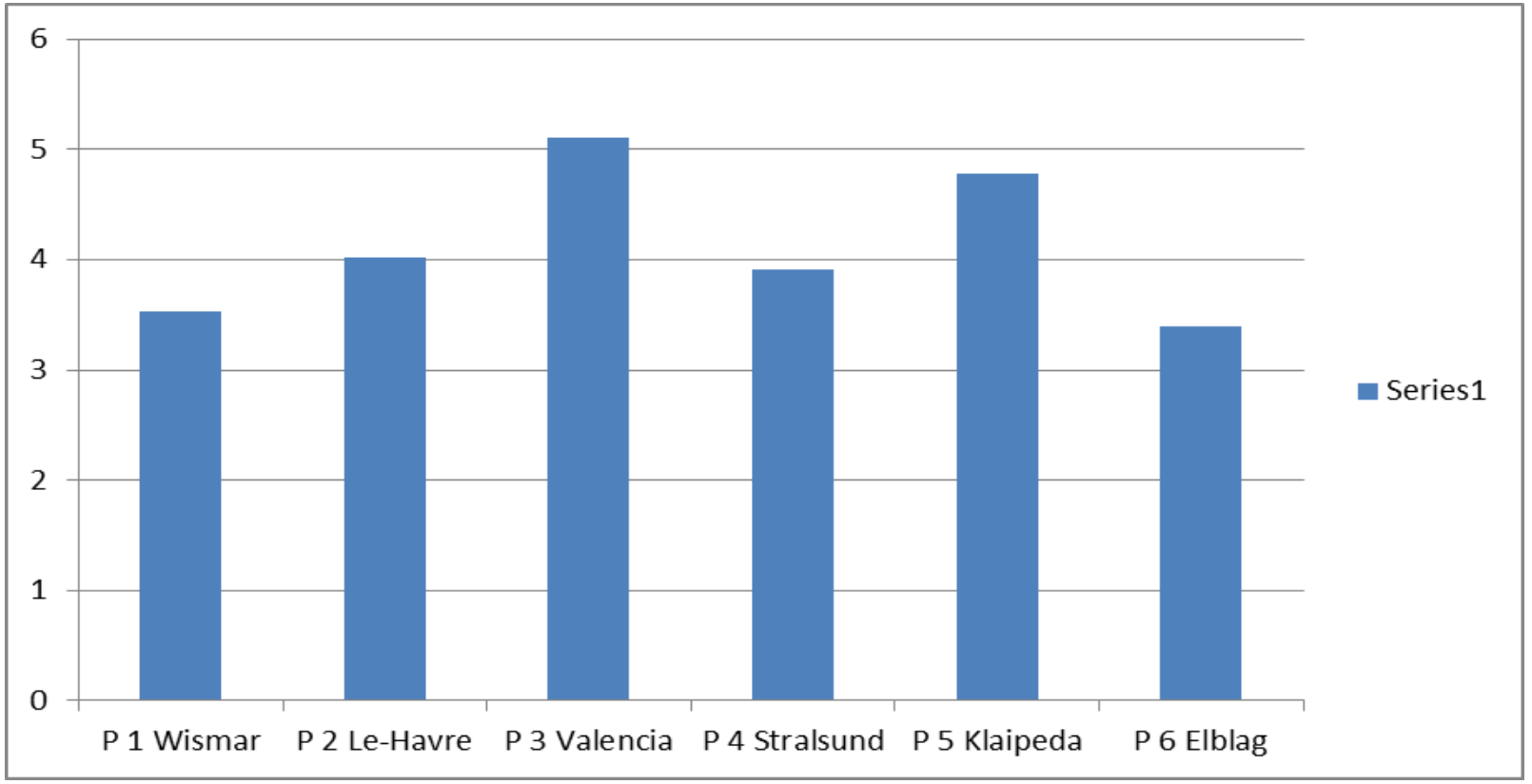
		PORT WISMAR			
			DESCRIPTION	MARK	
Seite 1 (4)	Externer Variablenname	Frame 1 V1	No digitalisation strategy exist	1	3
		Frame 2 V2	Pilot initiatives are planned	2	2
		Frame 3 V3	Digitalisation strategy is in development phase	3	2
		Frame 4 V4	Digitalisation strategy is formulated and defined	4	2
			Digitalisation strategy is in implementation phase	5	
			Digitalisation strategy is implemented	6	
			2.25	0.2	0.45
Seite 2(5)	Externer Variablenname	Frame 5 V5			1
		IT infrastructure V6	Very bad	1	5
		Automation technology V7	Bad	2	2
		Data analytics V8	Rather bad	3	2
		Data security / communications security V9	Rather good	4	5
		Development of / application of assistance systems V10	Good	5	3
		Collaboration software V11	Very good	6	5
		Non-technical skills such V12			4
		Frage 7 V13			4
			3.444444444	0.3	1.033333
Seite 3(6)	Measurement Functionality	Frage 8 V15	Same as Seite 2		3
		Frage 9 V16			4
		Frage 10 V17			4
		Frage 11 V18			5
		Frage 12 V19			4
		Frage 13 V20			4
			4	0.2	0.8
Seite 4(7)	Smart Enterprise-Resource-Planning-System	Smart Enterprise-Resource-Planning-System V22	Technology not known	1	5
		Smart Warehouse-Management-System V23	No use case available	2	5
		Smart Port-Community-System V24	Usage not planned	3	5
		Web-based Communication Platforms V25	Usage is planned	4	5
		Mobile Data Access for Employees V26	In specific projects already implemented	5	5
		Mobile Data Access for Customers V27	Comprehensive usage	6	5
		Internet-of-Tings V28			4
		Cloud Computing V29			5
		Localisation Technologies V30			4
		Sensors V31			4
		Big Data and Predictive Analytics V32			3
		Blockchain V33			3
		Artificial Intelligence V34			4
		Robotics V35			4
		Drones V36			4
		Autonomous Solutions V37			4
		Digital Twinning, Augmented and Virtual Reality V38			4
			4.294117647	0.25	1.073529
Seite 5(8)	Personal Network V39		Very low	1	4
	Printed Media V40		Low	2	3
	Internet V41		Rather low	3	4
	Social Media V42		Rather high	4	3
	Fairs V43		High	5	3
	Conferences V44		Very high	6	3
	Associations and Consultancies V45				3
	Scientific Institutions V46				4
			3.375	0.05	0.16875
			E	13.98856	3.525613
Seite 6(9)	Cargo throughput (tonnes)	Cargo total	6091976		
		Passengers	4445		
		Liquid bulk goods	2		
		Dry bulk goods	91		
		Containers	0		
		Ro-Ro mobile self-propelled units	0		
		Ro-Ro mobile non self-propelled units	0		
		Other	7		
Seite 1	2.25	0.45			
Seite 2	3.444444444	1.033333333			
Seite 3	4	0.8			
Seite 4	4.294117647	1.073529412			
Seite 5	3.375	0.16875			
TOTAL		3.525612745			



BENCHMARKING OF THE PORTS DIGITALIZATION RESULTS

P 1 Wismar	3.526	
P 2 Le-Havre	4.019	
P 3 Valencia	5.11	
P 4 Stralsund	3.91	
P 5 Klaipeda	4.78	
P 6 Elblag	3.39	
P 7		

BENCHMARKING OF THE PORTS DIGITALIZATION RESULTS



CONCLUSIONS

- **1. Digitalization of the small ports activities and management is very important, because today small and middle size ports digitalization are much less in comparison with large ports digitalization level.**
- **2. Presented methodology for the benchmarking ports digitalization could be used for the small, middle size and large ports auditing (evaluation).**

Thank you!