Connect2SmallPorts

within the frame of the South Baltic Programme

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1. Introduction

Since recent years, the interest in digital technologies and their progress in various industrial and service sectors increases. Due to the promising value proposition, the growing cross-sectoral distribution and the value creation potential of digital technologies, they also receive more and more recognition in the maritime industrial and transport sector (Philipp et al., 2020a; 2018). In the European context, especially large ports – the so-called core ports of the "Trans-European Transport Network" (TEN-T) – such as Rotterdam or Antwerp are already familiar with digital databased technologies like Blockchain or Internet-of-Things (IoT) and thus, continue to rely on a sustainable expansion of these advanced technologies that promise security, process optimization and sustainability. They are developing rapidly and merge into huge digital networks and platforms. By doing so, they connect and converge physical and digital worlds (i.e. machines, devices and humans). The main goal of such novel digital technologies is to optimize economic performance and energy demand, to reduce the consumption of resources and waste and to better qualify the service portfolio. Indeed, seaports rely on large transport and logistics companies when it comes to the development and implementation of innovative technology applications. Since major transport companies, such as Maersk, are already heavily investing in digital technologies that are regarded as the enablers for the digital transformation in the context of Industry and Logistics 4.0, it is important that also ports – including in particular small and medium-sized ports – take the opportunity to apply these novel technological solutions in order to integrate themselves in a sustainable way into global supply chains. Otherwise, in the long-term, this will result in uncatchable competitive disadvantages. Accordingly, dealing with new digital technologies is crucial for both, large core ports and small and medium-sized ports (Philipp et al., 2018).

Especially, when it comes to the novel visionary idea of a Smart port development, which currently receives a growing attention in practice and research landscape, the investigation of the digitalisation progress and related novel technologies becomes more and more important. The idea of a Smart port development is associated with an innovative endeavour where the focus is centred on improving the competitiveness of the port and facilitating entrepreneurial collaboration between different port stakeholders to achieve horizontal and vertical integration of supply chains (Douaioui et al., 2018). Hence, in such a scenario the port will be completely connected via a communications network and fully integrated with its environment (i.e. all stakeholders of the industry) as well as other ports and logistics actors around the globe. Accordingly, without the inclusion of small and medium-sized ports, this innovative idea stays unachievable. However, so far, this idea of a Smart port is still a vision. Nevertheless, it is expected that especially the usage and implementation of the newly arisen digital technologies will contribute substantial to the development towards Smart ports (Henesey et al., 2020).

Yet, especially smaller ports have no or limited knowledge regarding Industry 4.0, IoT and Blockchain, and what potentials they may bring. Hence, smaller ports often do not know about the already existing wide range of ICT solutions and current trends that allow optimising the infrastructure and transport services (Philipp et al., 2018; 2019a; 2019b; Philipp, 2020a). Next to this, in research and practice there exist a lack of concepts and models for measuring the digital performance of ports. Without such tools, it is impossible to audit the digital status of ports and to derive a concrete strategic roadmap for the digital transformation towards a sustainable Smart port development (Philipp et al., 2020b).

In response to this, the present report aims to apply a tool to assess the digital readiness of ports, and building upon this to use a concrete strategic graduation model that sets up the roadmap for the digital transformation towards a sustainable Smart port development. Thereby, the report provides a benchmarking that bases on implemented digital audits in ports, which refer to the status quo at the end of the year 2019. Hence, in the course of the Connect2SmallPorts project, part-financed by the European Union in the frame of the

INTERREG South Baltic programme 2014–2020, the project consortium approached small and medium-sized ports in South Baltic Sea. Nevertheless, due to interested port representatives and great feedback, the results of certain ports from the North Baltic Sea, North Sea and Mediterranean Sea were included as well in the present benchmark report.

The report is structure as follow: In the second chapter, the applied methodology is presented. Subsequently, the benchmarking results are highlighted (chapter three). Afterwards, the selected and applied Digital Readiness Index for Ports (DRIP model) and Strategic Graduation Model towards Smart Port Development that both jointly form the Digital Maturity Model towards Smart Port Development are evaluated on the basis of a SWOT analysis (chapter four). The report rounds up with a conclusion.

2. Methodology

2.1 Digital Readiness Index for Ports – DRIP Model

Generally, most of the digital and Industry 4.0 readiness indexes and maturity models on micro level that had been introduced in theory and practice target to evaluate the performance of manufacturing firms, which is deeply rooted in the fact that they are the main target group in the context of Industry 4.0. In particular, the overall logistics sector is relatively unaffected by digital and Industry 4.0 readiness indexes and maturity models. Thus, Decker and Blaschczok (2018) claimed in their study that they had been the first, who elaborated a digital readiness analysis in the logistics sector – in detail: digital readiness index for Logistics Service Providers (LSPs).

The research from Philipp et al. (2020b) confirmed this. Furthermore, they proposed on a theoretical basis a digital readiness index for ports in the frame of their literature review article, by what the related research gap of missing digital performance measurement instruments for ports was closed. This digital readiness index for ports is called DRIP and was developed on the basis of identified, analysed and triangulated literature findings from the research landscape and practice about Port Performance Indicators (PPIs) as well as digital and Industry 4.0 readiness indexes and maturity models, plus practical findings that had been elaborated in the course of the EU-project Connect2SmallPorts (i.e. WP3 – A3.1–3.3). Accordingly, it is the first of its kind and allows to audit the digital performance of ports, e.g. in the frame of a potential self-assessment or benchmarking. Consequently, the developed DRIP by Philipp et al. (2020b) has been used for the elaboration of the present report (cf. WP3 – A3.4–A3.5). As shown in Table 1, the DRIP consists of five dimensions and 38 related indicators, whereby some of them represent PPIs. The indicated weighting factors in the DRIP model represent the importance of each dimension, which had been determined during expert interviews with project experts in the course of the Connect2SmallPorts project (cf. WP3 report to A3.1–A3.3), whereby all 38 indicators are equally weighted in each dimension.

Table 1: Digital Auditing Tool for Ports – DRIP

Dimension	Weight	No.	Indicator (* = PPI)	Scale applied
Management	20%	1	Digitalisation Strategy (incl. Governance, Standards, Cultural Guidelines, Progress Indicators, etc.)	Implementation status: 1) Not existing, 2) Pilot initiatives are planned, 3) In development phase, 4) Formulated and defined, 5) Is in implementation phase, 6) Is implemented
		2	Digital Business Model	
		3	Innovation Cooperation	
		4	Investments in Digitalisation	Share of digital investments (x), proportion of employees with an IT educational background (x): 1) x ≤ 10%, 2) 10% < x ≤ 20%, 3) 20% < x ≤ 30%, 4) 30% < x ≤ 40%, 5) 40% < x ≤ 50%, 6) x > 50%
Human Capital	20%	5	IT Knowledge & Skills (Education)*	
		6	IT Capabilities*	Level of #capabilities, scope of training, adequacy of integrated communications, accuracy of information regarding status of shipment, provision of on-time of
		7	IT Training & Education Opportunities*	
Functionality (IT)	25%	8	Integrated Communications Infrastructure*	
		9	Information regarding Status of Shipment*	

		10	On-time of Information*	information, compatibility of operating system, degree of process adaptability in meeting customer requirements, degree of IT security: 1) Very bad, 2) Bad, 3) Rather bad, 4) Rather good, 5) Good, 6) Very good
		11	Operating System*	
		12	Processes*	
		13	Security	
Technology	30%	14	Smart ERP System	Degree of usage: 1) Technology/System not known, 2) No use case available, 3) Usage not planned, 4) Usage is planned, 5) In specific projects already implemented, 6) Comprehensive usage
		15	Smart WMS System	
		16	Smart PCS System (incl. Electronic SCM System)	
		17	Web-based Communication Platform	
		18	Mobile Data Access for Employees	
		19	Mobile Data Access for Customers	
		20	IoT (incl. Machine-to-Machine-Communication)	
		21	Cloud Computing (SaaS, PaaS, IaaS)	
		22	Localisation Technologies (GPS, RFID, etc.)	
		23	Sensors (Humidity, Temperature, etc.)	

		24	Big Data & Predictive Analytics (e.g. for Maintenance, etc.)	
		25	Blockchain (incl. Smart Contracts)	
		26	Artificial Intelligence (AI)	
		27	Robotics	
		28	Drones (Air, Land, Water)	
		29	Autonomous Solutions (Terminals, Cranes, Vehicles) – CPS (Cyber-Physical Systems)	
		30	Digital Twinning, Augmented & Virtual Reality (incl. Simulation)	
Information	5%	31	Personal Network	Degree of information procurement: 1) Very low, 2) Low, 3) Rather low, 4) Rather high, 5) High, 6) Very high
		32	Printed Media	
		33	Internet	
		34	Social Media Resources	
		35	Fairs	
		36	Conferences	
		37	Associations (e.g. Consultancy, etc.)	
		38	Scientific Institutions	

Source. Philipp et al., 2020b; Philipp, 2020b.

The following assessment presented in this report bases on primary data analysis according to the received qualitative data.[1] The digital auditing procedures took place in the setting of the EU-project Connect2SmallPorts (cf. WP3 – A3.4). The main target group is defined by small and medium-sized seaports from the South Baltic Sea Region (SBSR) – i.e. eligible catchment area of the INTERREG VA South Baltic programme. Thereby, medium-sized seaports are associated with comprehensive ports in the sense of the TEN-T, whereby small-sized ports do not belong to the TEN-T (i.e. Non-TEN-T ports). Nevertheless, from empirical data collection activities, large seaports (i.e. core ports in the sense of the TEN-T) were not precluded. In respect of the EU-project Connect2SmallPorts that is implemented in the INTERREG VA South Baltic programme, the geographical scope of data collections activities focused on the adjacent EU countries of the SBSR (namely: Germany, Lithuania, Poland, Denmark and Sweden). However, due to great interest and feedback received, in the frame of the present report the results of some ports from the North Baltic Sea, North Sea and Mediterranean Sea were included as well.

The empirical data collection took place between December 2019 and May 2020, and was online-based, whereby the invitation to the online survey "Digital Auditing in Small Ports" reached the target group via E-Mails – mainly reasoned by the occurred COVID-19 pandemic (cf. WP3 – A3.4). The participants of the online survey were informed on the first page of the online survey about the topic, aim and purpose of the survey and the EU-project Connect2SmallPorts as well as the subsequent data processing activities. Moreover, port representatives had been informed that participation in the survey is voluntary. At the end, these and further given information resulted in the option for the potential participants to

[1] Only in case of the two indicators "Investments in Digitalisation" and "IT Knowledge & Skills (Education)" also quantitative data was gathered. Accordingly, the majority (36 from 38 indicators) of elaborated data represents qualitative data.

agree on the indicated consent form and provided information, or not. All these information and explanations as well as the declaration of consent were showcased and implemented in order to be in line and to show compliance with the General Data Protection Regulation (EU) 2016/679 (GDPR) (Philipp et. al. 2019c). A print-version of the online survey is attached to the Appendix of this report.

2.2 Strategic Graduation Model towards Smart Port Development

In reflection of the study from Philipp (2020b) that builds upon the maturity models from Gill and VanBoskirk (2016) as well as Gardeitchik et al. (2017), and the Smart port value creation model from Deloitte (2017) based on Porter's Value Chain Analysis (Porter 1985), as well as results from conducted expert interviews, the Strategic Graduation Model towards Smart Port Development is presented in Table 2. The IT-based structured and semi-structured expert interviews had been conducted with top-level managers from selected seaports (Valencia – ES, Klaipeda – LT, Karlskrona – SE, Wismar and Stralsund – DE), which had been carried out in the course of the Connect2SmallPorts project. The interviews lasted about 1 hour. The results from the online survey "Digital Auditing in Small Ports", together with the findings from the expert interviews ensured to gain profound insights on the current digitalisation status of investigated ports. Moreover, expert interviews ensured as well the validation and subsequent verification of the Strategic Graduation Model towards Smart Port Development. Accordingly, interviews were recorded and transcribed. Hence, indicated recommendations and suggestions for improvements regarding proposed model were taken into account. Finally, these activities in the frame of the interview analysis according to Kvale (2008) and Miles et al. (1984) led to the Strategic Graduation Model towards Smart Port Development (cf. Table 2).

Table 2: Strategic Graduation Model towards Smart Port Development

Port classification	Characteristics	Strategy description	DRIP Score (x)
Smart port	The port is completely connected via a communications network and fully integrated with its environment (i.e. all stakeholders of the industry) as well as other ports and logistics actors around the globe. Scheduling of the various transport modes is optimised and real time cargo tracking with all relevant players involved is enabled.	Merge the physical and digital worlds. Ensure steady improvement by continuous development of sustainable and innovative business cases.	5.5 ≤ x ≤ 6.0
Developer port	The port and the hinterland players are connected through one single digital environment, the advantages of the previous stages are extended to even more stakeholders. Additional advantages are expected in overall planning and scheduling within the port and its hinterland. The port targets on continuous improvement.	Usage of digitalisation to create competitive advantage and maintain the competitive advantage by targeting on sustainable integration and ongoing enhancements. New businesses should be generated and ecosystem partnerships must expand.	4.5 ≤ x < 5.5

Adopter port	The port and immediately involved organisations (regularly: authority, operator, customs, etc.) started to integrate their (information) systems in order to achieve better communication. Hence, a small single digital environment will be created and several advantages such as better coordination and reduction of waiting times for all means of transportation can be achieved. The environment is perceived.	Prioritisation of customer relationships depending on own processes and service structure. Strategic decisions should be driven by analytics. Act on environmental changes and consider them in decision making process. Overall new business opportunities should be identifiable.	$3.5 \leq x < 4.5$
Monitor port	Individual automations in the port might emerge. Port authority, operator and related organisations in the near proximity of the port maintain their own processes and databases as well as started to digitalise them individually. Accordingly, information and relevant data is capture across specific nodes. The port environment is monitored. Regarding the customers, a statistics driven policy is driven.	Focus and improve adaptive capacities. Especially skills and knowledge of employees on all hierarchical levels should be enhanced, whereby outsourcing strategy for digital expertise represents a suitable alternative. Try to change observer role (slightly) to a more pro-active role.	$2.5 \leq x < 3.5$

Analog port	Automation do not exist. The port has no or less knowledge about digitalisation and thus, do not know how to change or is not willing. Furthermore, the port performs usually the landlord functions. Regarding customers, the first-come-first-serve policy is usually applied.	Change attitude by getting awareness of benefit and added value that comes from a sustainable digital development (i.e. digital transformation). Start sensing and shaping.	$1.0 \leq x < 2.5$

Source. Philipp, 2020b.

By taking into account the Strategic Graduation Model towards Smart Port Development, showcased in Table 2, it can be noted that the DRIP Model (i.e. Digital Readiness Index for Ports in Table 1) was extended by a component of a Digital Maturity Model. Accordingly, building upon the benchmarking and indexing of the ports via the DRIP, the current strategic positioning of the ports based on the respective digital performance that is characteristic for each of the different digital port types becomes obvious. As highlighted in Table 2, through this, the respective strategic recommendations for a sustainable development towards Smart port can be derived in accordance to each digital port class (Philipp, 2020b).

2.3 Benchmarking

The benchmarking was conducted on the basis of data aggregations and group comparisons in order to respect ports' data confidentiality. Within a first step, the study sample is grouped into the three categories in analogy of the TEN-T:

- Small ports ≙ Non-TEN-T ports,
- Medium-sized ports ≙ Comprehensive ports, and
- Large ports ≙ Core ports.

Thereby, for each group or class, on the basis of descriptive statistical analysis, the respective arithmetic means were calculated for all indicators of the DRIP Model highlighted in Table 1.

Within a second step, the study sample is structured according to the digital port classes according to the Strategic Graduation Model towards Smart Port Development showcased in Table 2:

- Smart ports,
- Developer ports,
- Adopter ports,
- Monitor ports, and
- Analog ports.

Thereby, for all ports in the study sample, on the basis of descriptive statistical analysis, the respective arithmetic means were calculated for each dimension of the DRIP Model outlined in Table 1, whereby also the final DRIP scores are displayed. This is complemented by the indication of the corresponding cargo turnovers (in tonnes) and number of passenger transitions.

Lastly, in the further discourse, Cramer‘s V is used in the frame of a multivariate statistical analysis:

There are two features X and Y, at least one of which should be nominally scaled. Cramer‘s V measures the strength of the statistical dependence between these two characteristics X and Y:

$$V = \sqrt{\frac{1}{N} * \frac{\chi^2}{\min((m-1);(n-1))}}$$

(1)

where:

$$\chi^2 = \sum_{i=1}^{m}\sum_{k=1}^{n}\frac{\left(h_{ik} - \frac{h_{i.} * h_{.k}}{N}\right)^2}{\frac{h_{i.} * h_{.k}}{N}} = N * \left[\left(\sum_{i=1}^{m}\sum_{k=1}^{n}\frac{h_{ik}^2}{h_{i.} * h_{.k}}\right) - 1\right]$$

(2)

2.4 Sample Description

The subsequent benchmarking findings (cf. chapter 3) base on the analysis of the aggregated assessments results of the ports that are highlighted and described in Table 3.

Table 3: Ports involved in Digital Audits

No.	Port	Country	Sea	TEN-T classification
1.	Klaipeda	Lithuania	South Baltic Sea	Core port
2.	Rostock	Germany	South Baltic Sea	Core port
3.	Lübeck	Germany	South Baltic Sea	Core port
4.	Wismar	Germany	South Baltic Sea	Comprehensive port
5.	Stralsund	Germany	South Baltic Sea	Non-TEN-T port
6.	Elbląg	Poland	South Baltic Sea	Non-TEN-T port
7.	Kołobrzeg	Poland	South Baltic Sea	Non-TEN-T port
8.	Hel	Poland	South Baltic Sea	Non-TEN-T port
9.	Copenhagen – Malmö	Denmark / Sweden	South Baltic Sea	Core port
10.	Trelleborg	Sweden	South Baltic Sea	Core port
11.	Luleå	Sweden	South Baltic Sea	Core port
12.	Karlskrona	Sweden	South Baltic Sea	Comprehensive port
13.	Ystad	Sweden	South Baltic Sea	Comprehensive port
14.	Karlshamn	Sweden	South Baltic Sea	Comprehensive port
15.	Landskrona	Sweden	South Baltic Sea	Non-TEN-T port
16.	Sölvesborg	Sweden	South Baltic Sea	Non-TEN-T port
17.	Södertälje	Sweden	South Baltic Sea	Non-TEN-T port
18.	Lindø (port of Odense)	Denmark	South Baltic Sea	Comprehensive port
19.	Rønne	Denmark	South Baltic Sea	Comprehensive port
20.	Køge	Denmark	South Baltic Sea	Comprehensive port
21.	Vejle	Denmark	South Baltic Sea	Comprehensive port
22.	Kalundborg	Denmark	South Baltic Sea	Comprehensive port
23.	Horsens	Denmark	South Baltic Sea	Non-TEN-T port
24.	Assens	Denmark	South Baltic Sea	Non-TEN-T port
25.	Vordingborg	Denmark	South Baltic Sea	Non-TEN-T port
26.	Esbjerg	Denmark	North Sea	Comprehensive port

27.	Hvide-Sande	Denmark	North Sea	Non-TEN-T port
28.	Rauma	Finland	North Baltic Sea	Comprehensive port
29.	Naantali	Finland	North Baltic Sea	Non-TEN-T port
30.	Valencia	Spain	Mediterranean Sea	Core port

Source. Authors' compilation

The ports of Berndshof, Greifswald, Haldensleben, Vierow, Lubmin and Wolgast also participated in the online survey. However, since the corresponding port representatives banned in all forms publishing any survey data, their answers were not used within the present report.

3. Results

3.1 Benchmarking Results according to TEN-T Classification

Within a first step of the benchmarking, the study sample was grouped into the three categories in analogy of the TEN-T. Hence, small ports are classified as Non-TEN-T ports, medium-sized ports are categorised as comprehensive ports and large ports are associated with core ports. The respective DRIP results on the basis of the arithmetic mean for each of indicator, structured according to the three different TEN-T classes, is shown in Table 4. Through this comparison, the strengths and weaknesses of small and medium-sized ports concerning their digital readiness and performance can be derived. Thereby, it was set in respect of the Strategic Graduation Model towards Smart Development in Table 2 that a digital readiness value below 3.5 has to be evaluated as low. Correspondingly, the bold-mark figures in Table 4 highlight the insufficiencies.

Regarding the dimension Management, it became obvious that small and medium-sized ports show low digital readiness in case of all respective indicators (i.e. “Digitalisation Strategy”, “Digital Business Model”, “Innovation Cooperation”, “Investments in Digitalisation”). In contrast, the core ports show a low digital readiness only in case of the indicator “Investments in Digitalisation”, but which is significantly higher than in case of the small and medium-sized ports.

Concerning the dimension Human Capital, it became apparent that all port classes in analogy of the TEN-T show low digital readiness regarding the PPI “IT Knowledge & Skills (Education)”. Regarding the PPI “IT Capabilities”, which is the single indicator in the overall DRIP Model, which was further distinguished, it can be stated that only the comprehensive ports show deficits in terms of the sub-indicators “Automation technology”, “Data analytics”, “Development of / application of assistance systems” and “Non-technical skills such as systems thinking and process understanding”.

In case of the dimension Functionality (IT), no grave backlogs were identifiable, which, on the one hand, means that the port representatives, who have participated in the online survey, are satisfied with the efficiency of their internal port processes in relation to the functionality of their IT systems, but on the other hand can be also reasoned by the fact that all DRIP indicators were collected in form of qualitative data, which may cause occurring subjective evaluations.

Concerning the Technology dimension, it was detected that small and medium-sized ports show low digital readiness in case of the following digital technologies and solutions:

- “Smart ERP System”
- “Smart WMS System”
- “Smart PCS System”
- “IoT”
- “Big Data & Predictive Analytics”
- “Blockchain”
- “AI”
- “Robotics”
- “Autonomous Solutions – CPS”
- “Digital Twinning, Augmented & Virtual Reality”

In contrast, large ports or core ports, respectively, show low digital readiness only in case of “Robotics” and “Autonomous Solutions – CPS”.

Lastly, by facing the results of the dimension Information, it can be derived that in case of small and medium-sized ports less used procurement sources are “Social Media Resources”, “Fairs” and “Scientific Institutions”.

Table 4: Digital Auditing Results structured according to TEN-T classes

Dimension	No.	Indicator (* = PPI)	No.	Sub-Indicator	Non-TEN-T Ports (small ports)	Comprehensive Ports (medium-sized ports)	Core Ports (large ports)	Total
Management	1	Digitalisation Strategy			**3.25**	**3.09**	5.00	3.60
	2	Digital Business Model			3.50	**3.09**	4.86	3.67
	3	Innovation Cooperation			**3.08**	**2.64**	4.86	**3.33**
	4	Investments in Digitalisation			**1.75**	**1.73**	**2.43**	**1.90**
Human Capital	5	IT Knowledge & Skills*			**1.33**	**1.09**	**2.29**	**1.47**
	6	IT Capabilities*	6.1	IT infrastructure	4.08	4.00	4.71	4.20
			6.2	Automation technology	3.58	**3.36**	4.57	3.73
			6.3	Data analytics	3.92	**3.36**	4.00	3.73
			6.4	Data security / communications security	4.50	4.36	4.71	4.50
			6.5	Development of / application of assistance systems	3.67	**3.27**	4.43	3.70
			6.6	Collaboration software	3.67	4.00	4.43	3.97
			6.7	Non-technical skills such as systems thinking and process understanding	4.17	**3.45**	4.86	4.07
	7	IT Training & Education Opportunities*			4.08	4.00	4.57	4.17
Functionality (IT)	8	Integrated Communications Infrastructure*			4.00	4.09	5.57	4.40
	9	Information regarding Status of Shipment*			3.92	4.18	5.14	4.30
	10	On-time of Information*			4.17	4.00	4.57	4.20
	11	Operating System*			4.17	4.55	4.86	4.47
	12	Processes*			4.17	4.36	4.86	4.40
	13	Security			4.42	4.82	5.14	4.73
Technology	14	Smart ERP System			**3.33**	**3.00**	4.29	**3.43**
	15	Smart WMS System			**2.92**	**3.09**	4.71	**3.40**
	16	Smart PCS System			**3.08**	3.55	5.14	3.73
	17	Web-based Communication Platform			4.42	4.64	4.86	4.60
	18	Mobile Data Access for Employees			4.83	5.09	5.57	5.10
	19	Mobile Data Access for Customers			4.00	4.09	4.86	4.23
	20	IoT			3.50	**3.36**	4.86	3.77
	21	Cloud Computing			3.67	3.82	4.71	3.97
	22	Localisation Technologies			4.25	3.82	5.29	4.33
	23	Sensors			4.83	3.91	4.71	4.47
	24	Big Data & Predictive Analytics			4.00	**3.36**	4.00	3.77
	25	Blockchain			**2.42**	**3.09**	3.86	**3.00**
	26	AI			**2.00**	**3.00**	3.71	**2.77**
	27	Robotics			**2.08**	**2.91**	**3.29**	**2.67**
	28	Drones			3.92	4.55	4.71	4.33
	29	Autonomous Solutions – CPS			**2.67**	**2.73**	**3.43**	**2.87**
	30	Digital Twinning, Augmented & Virtual Reality			**2.25**	**2.82**	3.57	**2.77**
Information	31	Personal Network			4.08	4.27	4.71	4.30
	32	Printed Media			3.75	3.55	4.57	3.87
	33	Internet			4.58	4.55	5.43	4.77
	34	Social Media Resources			**3.42**	3.55	4.57	3.73
	35	Fairs			3.83	**3.45**	4.00	3.73
	36	Conferences			4.00	3.82	4.29	4.00
	37	Associations			4.08	4.18	4.57	4.23
	38	Scientific Institutions			**3.42**	**3.27**	3.71	**3.43**

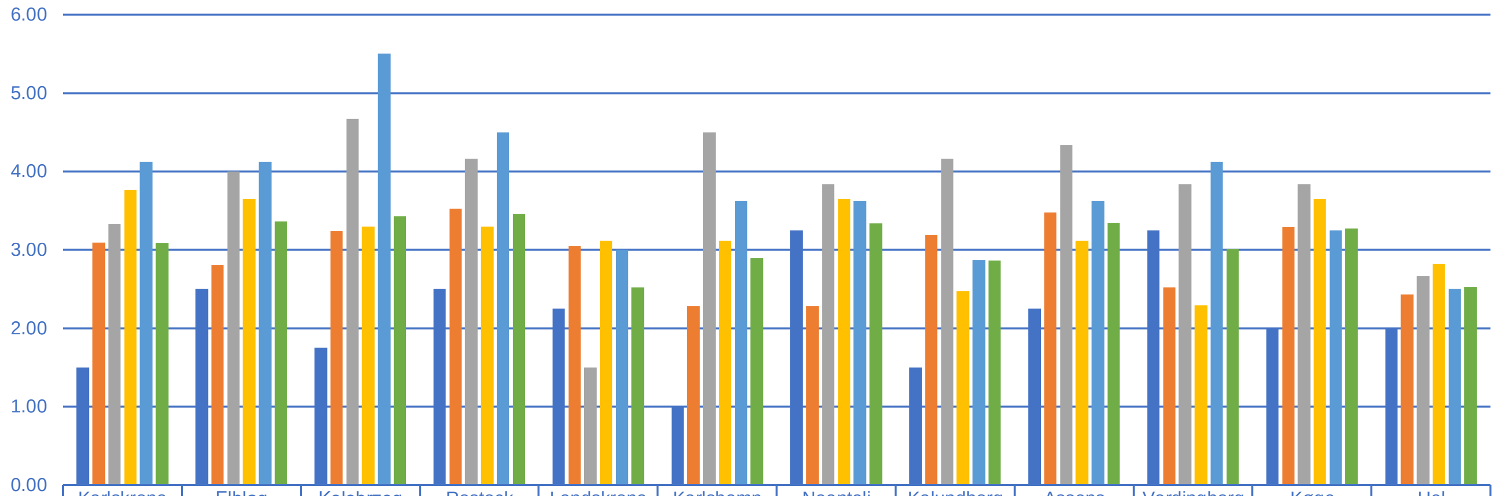
Source. Authors' compilation

3.2 Benchmarking Results according to Digital Port Classification

The examination of the digital readiness via the DRIP revealed for the study sample (cf. subchapter 2.4) no Analog port (cf. Table 2). Furthermore, relatively unsurprising was the finding that the study sample contains no Smart port, which can be mainly traced back to the fact mentioned above that Smart ports are still a vision of the future, in which a port will be completely automated and connected via a communications network and fully integrated with its environment (i.e. all stakeholders of the industry) as well as other ports and logistics actors around the globe. Therefore, the following subchapters show the results concerning the in-between digital port classes – namely Monitor ports, Adopter ports and Developer ports.

3.1.1 Monitor Ports

In sum, twelve ports can be classified as Monitor ports, of which seven are Non-TEN-T ports, four are comprehensive ports and one is a core port in the sense of the TEN-T. The results are highlighted in Figure 1. Therefore, it can be noted that the great majority of Monitor ports are small ports or Non-TEN-T ports, respectively. The corresponding description of the characteristics and the strategic recommendations for this digital port class of Monitor ports can be inferred from Table 2. The DRIP scoring results, cargo turnovers (in tonnes) and number of passenger transition in case of the identified Monitor ports show in comparison high differences (cf. Figure 1 and 2).



	Karlskrona	Elbląg	Kołobrzeg	Rostock	Landskrona	Karlshamn	Naantali	Kalundborg	Assens	Vordingborg	Køge	Hel
Management (without weighting factors)	1.50	2.50	1.75	2.50	2.25	1.00	3.25	1.50	2.25	3.25	2.00	2.00
Human Capital (without weighting factors)	3.10	2.81	3.24	3.52	3.05	2.29	2.29	3.19	3.48	2.52	3.29	2.43
Functionality (IT) (without weighting factors)	3.33	4.00	4.67	4.17	1.50	4.50	3.83	4.17	4.33	3.83	3.83	2.67
Technology (without weighting factors)	3.76	3.65	3.29	3.29	3.12	3.12	3.65	2.47	3.12	2.29	3.65	2.82
Information (without weighting factors)	4.13	4.13	5.50	4.50	3.00	3.63	3.63	2.88	3.63	4.13	3.25	2.50
DRIP Score	3.09	3.36	3.43	3.46	2.52	2.90	3.34	2.86	3.35	3.01	3.27	2.52

Figure 1: Digital Auditing Results of Monitor Ports

Source. Authors' compilation.

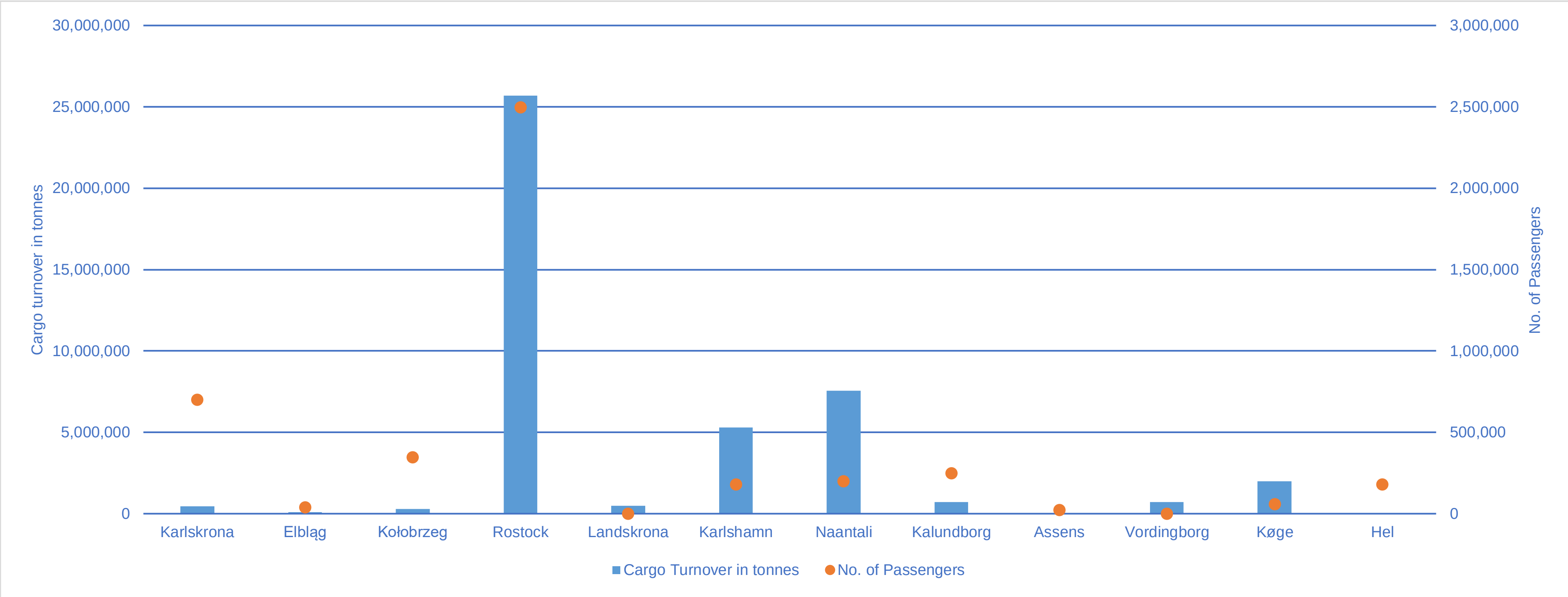
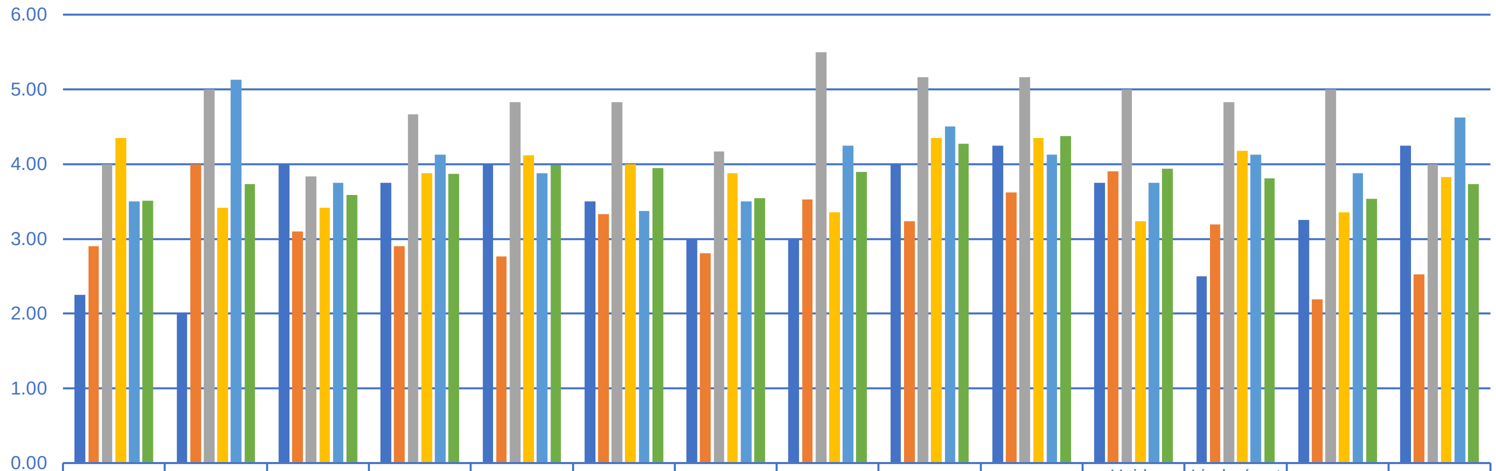


Figure 2: Cargo Turnover and Passenger Transition of Monitor Ports

Source. Authors' compilation.

3.1.2 Adopter Ports

In sum, 14 ports were classified as Adopter ports, of which five are non-TEN-T ports, seven are comprehensive ports and two are core ports in the sense of the TEN-T. The results are highlighted in Figure 3. Therefore, it can be noted that the great majority of Adopter ports are medium-sized ports or comprehensive ports, respectively. The corresponding description of the characteristics and the strategic recommendations for this digital port class of Adopter ports can be inferred from Table 2. The respective cargo turnovers (in tonnes) and number of passenger transition for the Adopter ports are presented in Figures 4.



	Wismar	Stralsund	Ystad	Rauma	Sölvesborg	Horsens	Luleå	Vejle	Lübeck	Södertälje	Hvide Sande	Lindø (port of Odense)	Esbjerg	Rønne
Management (without weighting factors)	2.25	2.00	4.00	3.75	4.00	3.50	3.00	3.00	4.00	4.25	3.75	2.50	3.25	4.25
Human Capital (without weighting factors)	2.90	4.00	3.10	2.90	2.76	3.33	2.81	3.52	3.24	3.62	3.90	3.19	2.19	2.52
Functionality (IT) (without weighting factors)	4.00	5.00	3.83	4.67	4.83	4.83	4.17	5.50	5.17	5.17	5.00	4.83	5.00	4.00
Technology (without weighting factors)	4.35	3.41	3.41	3.88	4.12	4.00	3.88	3.35	4.35	4.35	3.24	4.18	3.35	3.82
Information (without weighting factors)	3.50	5.13	3.75	4.13	3.88	3.38	3.50	4.25	4.50	4.13	3.75	4.13	3.88	4.63
DRIP Score	3.51	3.73	3.59	3.87	3.99	3.94	3.54	3.90	4.27	4.38	3.94	3.81	3.54	3.73

Figure 3: Digital Auditing Results of Adopter Ports

Source. Authors' compilation.

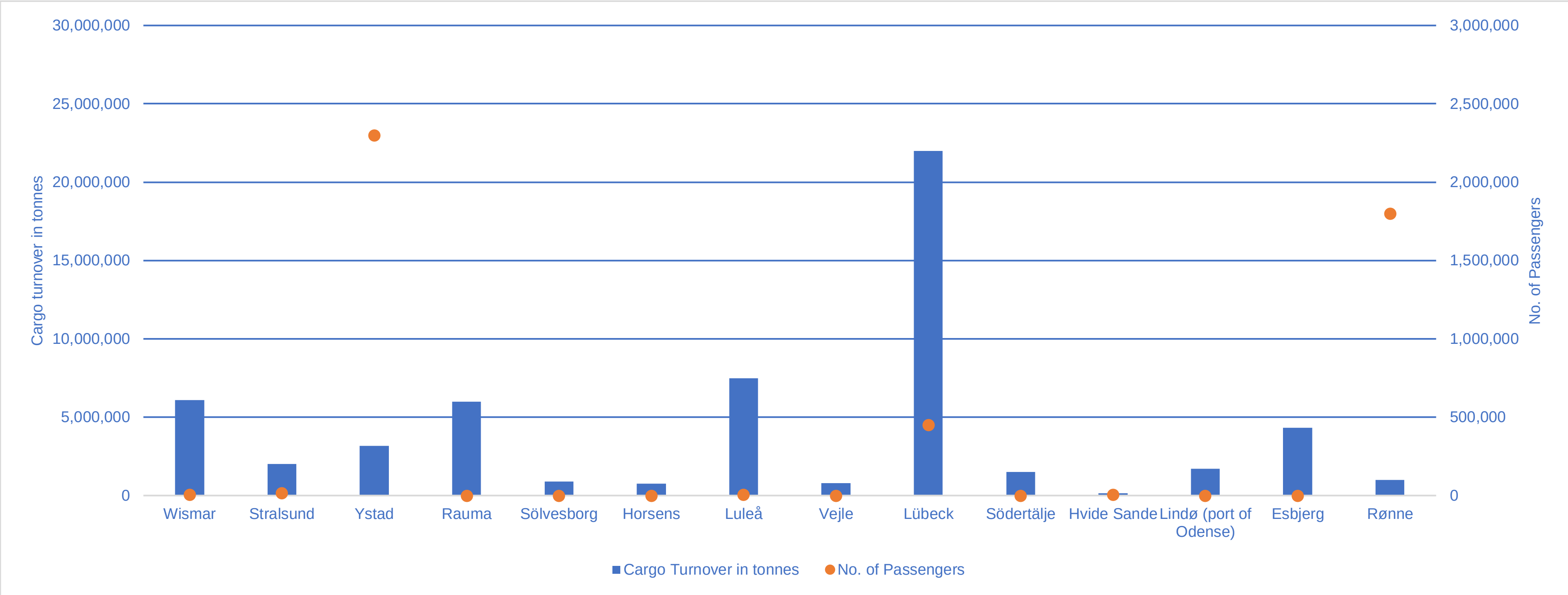
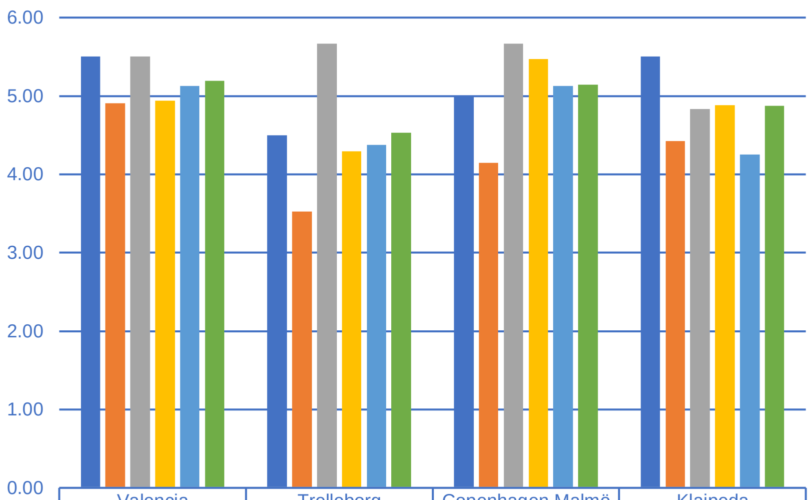


Figure 4: Cargo Turnover and Passenger Transition of Adopter Ports

Source. Authors' compilation.

3.1.3 Developer Ports

In sum, four ports can be classified as Developer ports, of which all are core ports in the sense of the TEN-T. The results are highlighted in Figure 5. Therefore, it can be noted that the highest digital readiness is detectable in case of core ports, which somehow is not surprising, but plausible and thus, value adding. The corresponding description of the characteristics and the strategic recommendations for this digital port class of Developer ports can be inferred from Table 2. The respective cargo turnovers (in tonnes) and number of passenger transition for the Developer ports are presented in Figures 6.



	Valencia	Trelleborg	Copenhagen Malmö	Klaipeda
Management (without weighting factors)	5.50	4.50	5.00	5.50
Human Capital (without weighting factors)	4.90	3.52	4.14	4.43
Functionality (IT) (without weighting factors)	5.50	5.67	5.67	4.83
Technology (without weighting factors)	4.94	4.29	5.47	4.88
Information (without weighting factors)	5.13	4.38	5.13	4.25
DRIP Score	5.19	4.53	5.14	4.87

Figure 5: Digital Auditing Results of Developer Ports

Source. Authors' compilation.

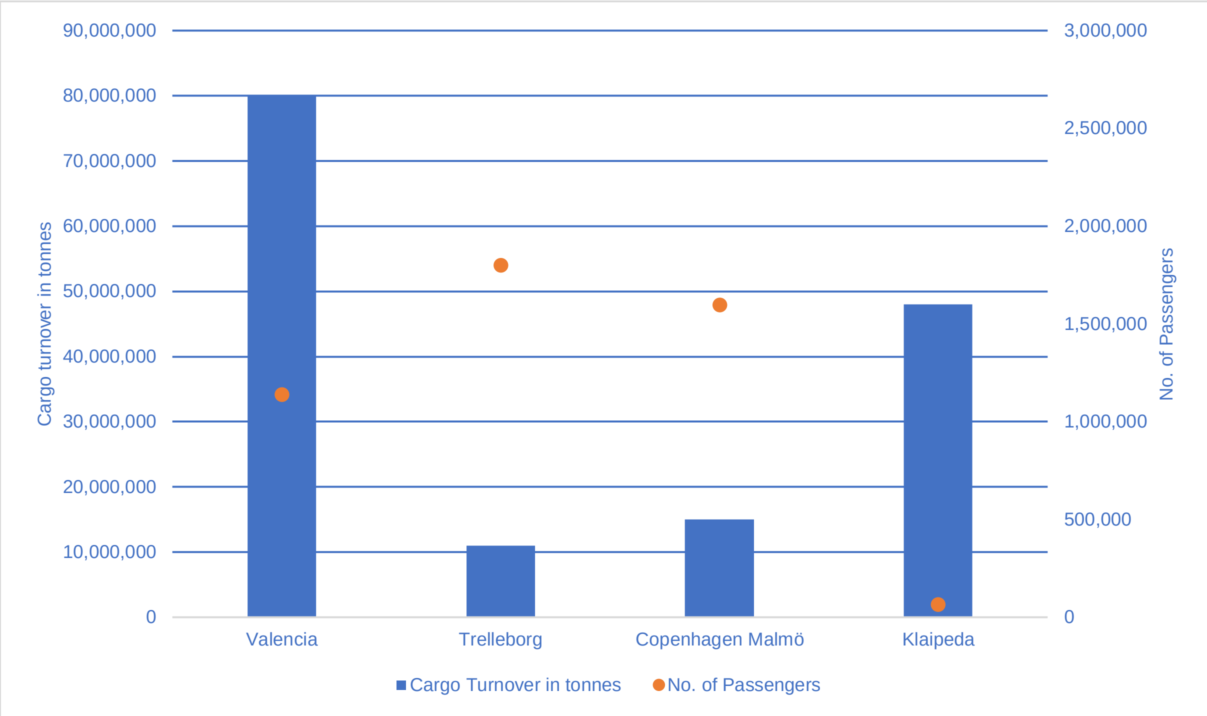


Figure 6: Cargo Turnover and Passenger Transition of Adopter Ports

Source. Authors' compilation.

3.3 Multivariate Statistical Analysis

According to the insights gained from the benchmarking, it can be abstracted that there exist a potential statistical dependence between the classification of the digital readiness in accordance with the Strategic Graduation Model towards Smart Port Development (cf. Table 2) and the TEN-T classification. Hence, building upon the findings from the previous subchapters, the following contingency table can be drawn (cf. Table 4).

Table 5: Contingency Table

	Non-TEN-T Port	Comprehensive Port	Core Port	Total
Monitor Port	7	4	1	12
Adopter Port	5	7	2	14
Developer Port	0	0	4	4
Total	12	11	7	30

Source. Authors' compilation

The corresponding χ^2 yields 16.579, which delivers for Cramer's V a value of 0.526. Furthermore, the significance test revealed that this result is significant at the 0.01 level (1-tailed). Accordingly, there exist a statistical significant relationship between the two features digital readiness class and TEN-T class.

The DRIP classes (i.e. Monitor port, Adopter port, Developer port) base on the achieved DRIP score results that are metrically scaled. Hence, depending on the interpretations of the TEN-T classes, which usually also follow a ranked and thus, ordinal order, it can be stated that the better the digital readiness class (i.e. Monitor port, Adopter port, Developer port), the greater the importance of or larger the port (Non-TEN-T port, Comprehensive port, Core port) – *et vice versa*.

Thus, the multivariate statistical analysis based on Cramer's V confirms the presumed relationship between the two properties digital port classes and TEN-T classes.

4. Discussion

For the evaluation of the DRIP Model and Strategic Graduation Model towards Smart Port Development, which both jointly form the Digital Maturity Model for Ports, the SWOT analysis is used, as it is a suitable assessment tool in the frame of the strategic management. Thereby, the SWOT analysis of the digital auditing tool bases on the traditional items Strengths, Weaknesses, Opportunities and Threats. The findings are highlighted in Table 4.

Table 6: SWOT Analysis of the Digital Auditing Tool

Strengths	Weaknesses
1. Delivers profound information about ports' digital activities and readiness, which is not ensured by other comparable tools in science and practice, since both, the DRIP Model and Strategic Graduation Model towards Smart Port Development are the first of their kind 2. Provides valuable strategic recommendations in the frame of setting up the roadmap for the digital transformation towards Smart port development (i.e. derivable	1. Both Models focus on the measurement of the digital readiness only and only on a qualitative basis; thus – for instance – information about port organisation and port administration working time on a quantitative basis is not collected, which could provide additional meaningful information in the frame of evaluating the effectiveness of digital measures 2. The Digital Maturity Model rather addresses port mangers, who have a

recommendations and suggestions for ports, policies and further stakeholders) 3. Relatively quick collection of a big amount of meaningful data, which can be easily evaluated and understood in respect to the digitalisation context 4. Manageable expenditure of time for the participant in the frame of a quick self-assessment – e.g. for identifying the own digital transformation progress 5. Easy online access for participants; i.e. allows to assess the digital performance at any time and from everywhere: https://connect2smallports.eu/digital-auditing/	comprehensive overview about all digital port actions; hence, the individual perception of port operational staff, who might have a more detailed view on specific aspects on operational level, is not covered 3. Absence of comprehensive KPIs that measure the operative performance of ports, which would allow to examine the latent relationship between digital and operative port performance

Opportunities	Threats
1. The data collection via the DRIP can be easily combined with further secondary, but also primary data – e.g. official port statistics → this bears the potential for even greater application areas concerning additional investigations by the port representatives, policy makers, further stakeholders and scientists 2. The DRIP Model and the Strategic Graduation Model towards Smart Port Development bear the potential to become smoothly adopted by ports as an assessment tool and assistant system in the frame of their digital development programmes and projects 3. The Digital Maturity Model for Ports can be easily applied on a large scale, i.e. it is possible to apply the underlying tools on pan-European level or globally, which – for instance –	1. Possibly less acceptance by port representatives due to the widespread classical philosophy: "We do not need to digitalise, since our port processes are efficient and thus, this is rather a topic for the future!" 2. Risk of overemphasizing by port representatives concerning the strategic recommendations outlined in the Strategic Graduation Model towards Smart Port Development; and thus, crass neglect of further or other important and traditional measures that concern the operative management 3. Risk of misunderstanding the digital auditing tools showcased in this current report: for instance, exclusive focus on and excessive investment in novel digital technologies and solutions as outlined in the corresponding dimension in frame of the DRIP Model

allows to compare the digital readiness of ports in respect to different countries; this is ensured, since the underlying models allow to measure the digital performance of ports regardless their size and cargo preference 4. If the scope of audited ports is extended, the digital auditing tool allows to derive best practices from very well digitalized ports 5. The DRIP Model and the Strategic Graduation Model towards Smart Port Development assist the digital awareness raising even among small ports, which in turn, has the potential to contribute substantial to the EU Blue Growth Strategy, the EU Integrated Maritime Policy and the Europe 2020 Strategy, since ports are the main drivers of Blue Growth, as all economic actions concerning the different Blue Economy sectors (i.e. port activities provide the basic infrastructure and services for many	→ Answer: The five dimensions were integrated into the tool, since the digital transformation process is not ensured through the sole integration of novel technologies and solutions; rather it is the result of the interplay of management measures and employees' knowledge, skills and capabilities, as well as functional and prepared IT processes and systems, with these, according to the literature, enabling technologies; accordingly, all dimensions intertwine, and, in this way, enable a sustainable digital transformation in ports, which, in turn, requires a holistic auditing of their digital readiness; additionally, a comprehensive information procurement is important in order to be able to identify appropriate and sustainable measures and investments on the path to becoming a Smart port

other sectors, including Marine Living Resources, Marine Non-living Resources, Marine Renewable Energy, Maritime Transport, Coastal Tourism, Maritime Defence, etc.) more or less start at, relate to, or take place via ports; whereby emanating spill-over effects naturally go beyond the Maritime Economy, as ports are key service providers to the entire economy	

Source. Authors' compilation

5. Conclusion

The aim of the current report was to benchmark the digital performance of ports and identify barriers related to the sustainable digital transformation in case of small and medium-sized ports in SBSR. The benchmarking results according to the TEN-T classes revealed the strengths and weaknesses of small and medium-sized ports in the frame of their digital transformation. In reflection of the carved out findings in the corresponding subchapter 3.1, it can be implied that small and medium-sized ports have to take measures to overcome their backlogs concerning the DRIP dimensions Management and Human Capital, since without a clear “Digitalisation Strategy”, “Innovation Cooperation” activities, “Investments in Digitalisation”, the necessary “IT Knowledge & Skills”, as well as “IT Capabilities”, the digital performance and transformation will not be safeguarded, since these aspects represent the essential and fundamental framework conditions. The Functionality of the IT processes and services can be ensured through an effective and appropriate deployment of the different digital technologies and solutions, both of which can only be efficaciously tackled if the basic conditions – regarding Management and Human Capital – are adequately met (Philipp, 2020c).

The multivariate statistical analysis in subchapter 3.3 revealed the statistically significant relationship between the digital port classes of the Strategic Graduation Model towards Smart Port Development (cf. Table 2) and the TEN-T classes. Hence, depending on the interpretations of the TEN-T classes, it can be stated that the better the digital readiness class (i.e. Monitor port, Adopter port, Developer port), the better the importance or greater the port (Non-TEN-T port, Comprehensive port, Core port). This is true, although Cramer's V naturally do not shows the direction (i.e. positive or negative) of the identified dependency, since both class types are either indirectly derived from a metrically scaled score result (here: DRIP scores) or base on a ranking order (here: Trans-European Transport Network – TEN-T). The strength of the statistically significant dependency can be evaluated as moderate.

Correspondingly, if the TEN-T classes are interpreted as size and thus growth classes, or as indicators for the relevance of the ports in the context of the European transportation system, it can be derived that a sustainable growth development of ports, nowadays, significantly depends on the digital performance of the ports. Furthermore, since the highest digital readiness (here: Developer ports) was observable in case of core ports only, it can be further suggested that also small and medium-sized ports or Non-TEN-T and comprehensive ports, respectively, should initiate or expand their digital measures and thus, enhance their digital performance, in order to improve their competiveness and impel their sustainable development.

However, on the basis of the benchmarking results structured according to the digital port classes, which was complemented by the indication of the corresponding cargo turnovers (in tonnes) and number of passenger transition in subchapter 3.2, it is necessary to point out that a similar digitalisation level of the ports does not mean that they are similar in cargo turnover size / number of passenger transition. For example, Rostock port is a core port according to the TEN-T and had a cargo turnover of about 25.7 million tonnes and a passenger transition of about 2.5 million in 2019, while the port has to be classified as a Monitor port only, according to the achieved DRIP score in combination with the Strategic Graduation Model towards Smart Port Development in Table 2. Moreover, Naantali port is a Non-TEN-T port, but had a cargo turnover of 7.57 million tonnes and a passenger transition of 0.2 million in 2019, while its digital readiness is also typical for a Monitor port. Karlskrona, Karlshamn, Kalundborg and Køge are comprehensive ports according to the TEN-T and had a cargo throughput between 0.45 and 5.3 million tonnes as well as a passenger transition between 0.06 to 0,7 million, but show up the same degree of digitalisation (here: Monitor ports). Accordingly, by having a holistic view on all findings, it can recommended to expand the scope of digital audits in the SBSR in order to receive a more robust database, and subsequently, to perform further multivariate statistical analyses in order to investigate the latent relationship between the digital and operative performance of ports. This will – for sure – deliver further value adding insights in the digital transformation of seaports.

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Appendix: Online Survey – Digital Auditing in Small Ports

Connect2SmallPorts Project Team relies on You and Your feedback!

QUESTIONNAIRE ON DIGITAL AUDITING IN SMALL PORTS
in the frame of the EU project "Connect2SmallPorts – South Baltic Small Ports as Gateways towards Integrated Sustainable European Transport System and Blue Growth by Smart Connectivity Solutions", part-financed by the European Regional Development Fund (ERDF) within the Interreg South Baltic Programme 2014-2020.

PROJECT AND QUESTIONNAIRE FICHE
Connect2SmallPorts is a non-profit project that focuses on improving cross-border connectivity for a functional blue and green transport area. The project aims to enhance the quality and environmental sustainability of transport services in the South Baltic Sea area. Thereby, in particular, the project focalises real-life existing and not artificial problems of Blue Growth and targets at improving IT and infrastructural capacity of small ports in South Baltic Sea Region.
The aim of the questionnaire "Digital Auditing in Small Ports" is to analyse and index ports according to their performance and readiness for the digitalisation.

It takes you only 5 minutes to complete this questionnaire.

All participants, who completed the questionnaire, are invited to join for free one of the following study visits that are planned during the next two years (2020-2021) by the Connect2SmallPorts team (two persons per organisation/port):
- Singapore,
- Dubai,
- Valencia,
- Turku.
If you are interested to join one of the abovementioned study visits, please write an E-Mail to the contact person indicated on the last page of the survey.

DATA PROTECTION CLAUSE AND DECLARATION OF CONSENT
This declaration of consent asks you to allow the researcher to record and use your answers and information to enhance knowledge and understanding of the declared topic and research field mentioned above. Participation in this questionnaire is completely voluntary. Data collected will be analysed and further processed in an aggregated form. All collected data will always be treated in accordance with current EU data protection legislation. By ticking the box below (i.e. agree to the processing), you give your declaration of consent and assure that you have read the description of the study and questionnaire as well as agree to the data protection clause and terms and conditions described.

Thank you for your time and feedback!

CONTACT
Project Leader
Robert Philipp
European Project Center
Hochschule Wismar, University of Applied Sciences: Technology, Business and Design
E-Mail: robert.philipp[at]hs-wismar.de

If you would like to obtain more information about the processing of your personal data, please click here

☐ I agree to the processing of my personal data in accordance with the information provided herein

I don't want to participate

START THE SURVEY

CONNECT2SMALLPORTS
Interreg South Baltic
EUROPEAN UNION
European Regional Development Fund

General Section

What is the name of your port?

What is your contact E-Mail address?

13% CONTINUE

CONNECT2SMALLPORTS
Interreg South Baltic
EUROPEAN UNION
European Regional Development Fund

Digital performance measurement

Management

1. What is the implementation status of your digitalisation strategy (incl. governance, standards, cultural guidelines, progress indicators, etc.)?

No digitalisation strategy exist	Pilot initiatives are planned	Digitalisation strategy is in development phase	Digitalisation strategy is formulated and defined	Digitalisation strategy is in implementation phase	Digitalisation strategy is implemented
○	○	○	○	○	○

2. What is the implementation status of your digital business model(s)?

No digital business model exist	Pilot initiatives are planned	Digital business model(s) is/are in development phase	Digital business model(s) is/are formulated and defined	Digital business model(s) is/are in implementation phase	Digital business model(s) is/are implemented
○	○	○	○	○	○

3. What is the implementation status of your innovation cooperations?

No innovation cooperations exist	Pilot initiatives are planned	Innovation cooperations are in development phase	Innovation cooperations are formulated and defined	Innovation cooperations are in implementation phase	Innovation cooperations are implemented
○	○	○	○	○	○

4. What is your share of digital investments (x) in relation to total investments?

$x \leq 10\%$	$10\% < x \leq 20\%$	$20\% < x \leq 30\%$	$30\% < x \leq 40\%$	$40\% < x \leq 50\%$	$x > 50\%$
○	○	○	○	○	○

BACK 25% CONTINUE

CONNECT2SMALLPORTS Interreg South Baltic EUROPEAN UNION European Regional Development Fund

Digital performance measurement

Human Capital

5. What is the proportion of employees with an IT educational background (x)?

x ≤ 10%	10% < x ≤ 20%	20% < x ≤ 30%	30% < x ≤ 40%	40% < x ≤ 50%	x > 50%
○	○	○	○	○	○

6. What is the skill level (capabilities) of your employees regarding the following topics?

	Very bad	Bad	Rather bad	Rather good	Good	Very good
IT infrastructure	○	○	○	○	○	○
Automation technology	○	○	○	○	○	○
Data analytics	○	○	○	○	○	○
Data security / communications security	○	○	○	○	○	○
Development of / application of assistance systems	○	○	○	○	○	○
Collaboration software	○	○	○	○	○	○
Non-technical skills such as systems thinking and process understanding	○	○	○	○	○	○

7. How would you evaluate the scope of training and education possibilities for your employees?

Very bad	Bad	Rather bad	Rather good	Good	Very good
○	○	○	○	○	○

BACK 38% CONTINUE

CONNECT2SMALLPORTS Interreg South Baltic EUROPEAN UNION European Regional Development Fund

Digital performance measurement

Functionality (IT)

8. How do you evaluate the adequacy of your integrated communications infrastructure?

Very bad	Bad	Rather bad	Rather good	Good	Very good
○	○	○	○	○	○

9. How do you evaluate the accuracy of information regarding status of shipment?

Very bad	Bad	Rather bad	Rather good	Good	Very good
○	○	○	○	○	○

10. How do you evaluate the provision of on-time of information?

Very bad	Bad	Rather bad	Rather good	Good	Very good
○	○	○	○	○	○

11. How do you evaluate the compatibility of your operating system?

Very bad	Bad	Rather bad	Rather good	Good	Very good
○	○	○	○	○	○

12. How do you evaluate the degree of process adaptability in meeting customer requirements?

Very bad	Bad	Rather bad	Rather good	Good	Very good
○	○	○	○	○	○

13. How do you evaluate the degree of IT security?

Very bad	Bad	Rather bad	Rather good	Good	Very good
○	○	○	○	○	○

BACK 50% CONTINUE

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Digital performance measurement

Technology

14. How do you evaluate the degree of usage regarding the following technologies and systems?

	Technology not known	No use case available	Usage not planned	Usage is planned	In specific projects already implemented	Comprehensive usage
Smart Enterprise-Resource-Planning-System	○	○	○	○	○	○
Smart Warehouse-Management-System	○	○	○	○	○	○
Smart Port-Community-System (incl. Electronic Supply-Chain-Management-System)	○	○	○	○	○	○
Web-based Communication Platforms	○	○	○	○	○	○
Mobile Data Access for Employees	○	○	○	○	○	○
Mobile Data Access for Customers	○	○	○	○	○	○
Internet-of-Tings (incl. Machine-to-Machine-Communication)	○	○	○	○	○	○
Cloud Computing (Software-as-a-Service – SaaS, Platform-as-a-Service – PaaS, Infrastructure-as-a-Service – IaaS)	○	○	○	○	○	○
Localisation Technologies (GPS, RFID, etc.)	○	○	○	○	○	○
Sensors (Humidity, Temperature, etc.)	○	○	○	○	○	○
Big Data and Predictive Analytics (incl. Maintenance, etc.)	○	○	○	○	○	○
Blockchain (incl. Smart Contract Applications)	○	○	○	○	○	○
Artificial Intelligence (AI)	○	○	○	○	○	○
Robotics	○	○	○	○	○	○
Drones (Air, Land, Water)	○	○	○	○	○	○
Autonomous Solutions (Terminals, Cranes, Vehicles) – Cyber-Physical-Systems (CPS)	○	○	○	○	○	○
Digital Twinning, Augmented and Virtual Reality (incl. Simulation)	○	○	○	○	○	○

BACK 63% CONTINUE

Digital performance measurement

Information

15. How do you evaluate your degree of information procurement from the following sources regarding the digitalisation theme?

	Very low	Low	Rather low	Rather high	High	Very high
Personal Network	○	○	○	○	○	○
Printed Media	○	○	○	○	○	○
Internet	○	○	○	○	○	○
Social Media	○	○	○	○	○	○
Fairs	○	○	○	○	○	○
Conferences	○	○	○	○	○	○
Associations and Consultancies	○	○	○	○	○	○
Scientific Institutions	○	○	○	○	○	○

BACK 75% CONTINUE

CONNECT2SMALLPORTS Interreg South Baltic EUROPEAN UNION European Regional Development Fund

Operational performance measurement

16. What is your (expected/estimated) cargo throughput and passenger transition/transit in 2019?

Cargo throughput (tonnes) =	
Passenger transition (no. of passengers) =	

17. What cargo types do you handle and what is the respective proportion (based on the total cargo throughput in 2019)?

	0 — 100	%
Liquid bulk goods		0 %
Dry bulk goods		0 %
Containers		0 %
Ro-Ro mobile self-propelled units		0 %
Ro-Ro mobile non self-propelled units		0 %
Others not specified		0 %
Total		0 %

BACK 88% CONTINUE

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YOU HAVE SUCCESSFULLY COMPLETED THE SURVEY.

THANK YOU VERY MUCH FOR YOUR SUPPORT.

If you would like to ask any specific issues or have any other inquiries related to this questionnaire or the project, please feel free to contact any of the Connect2SmallPorts project team members or the project Lead Partner.

CONTACT

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100%