Global Port Productivity Trends

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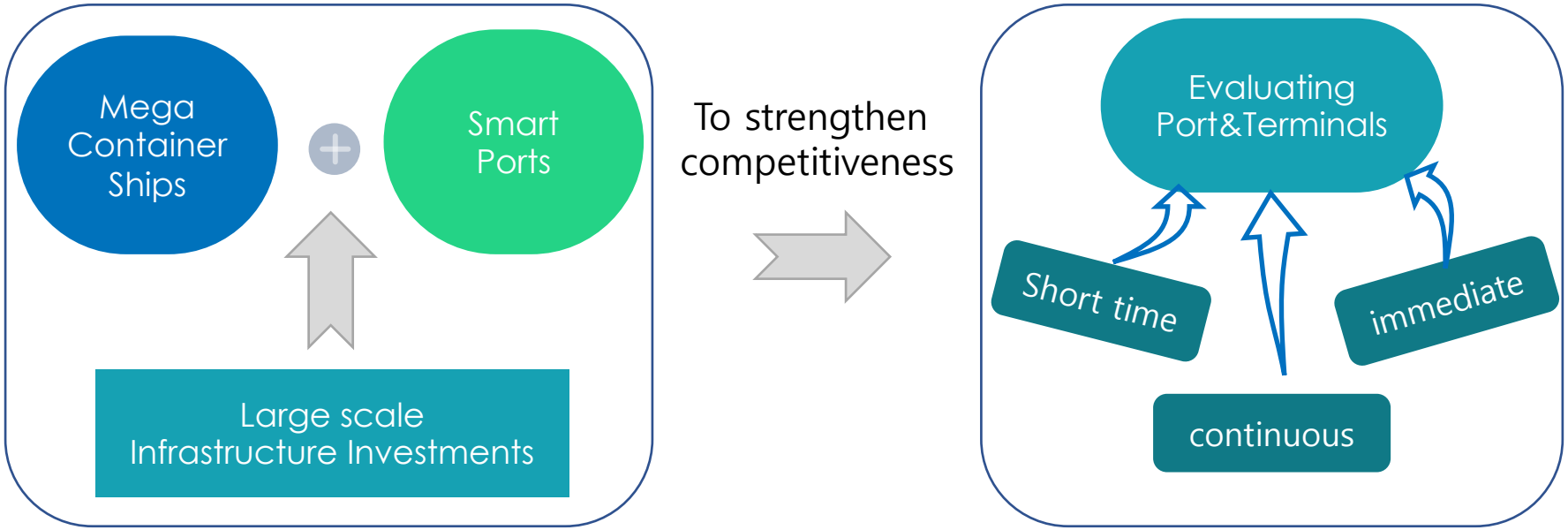
- Background and purpose of the study
- Methodology
- Results
- Contribution and Limitation
- Q&A

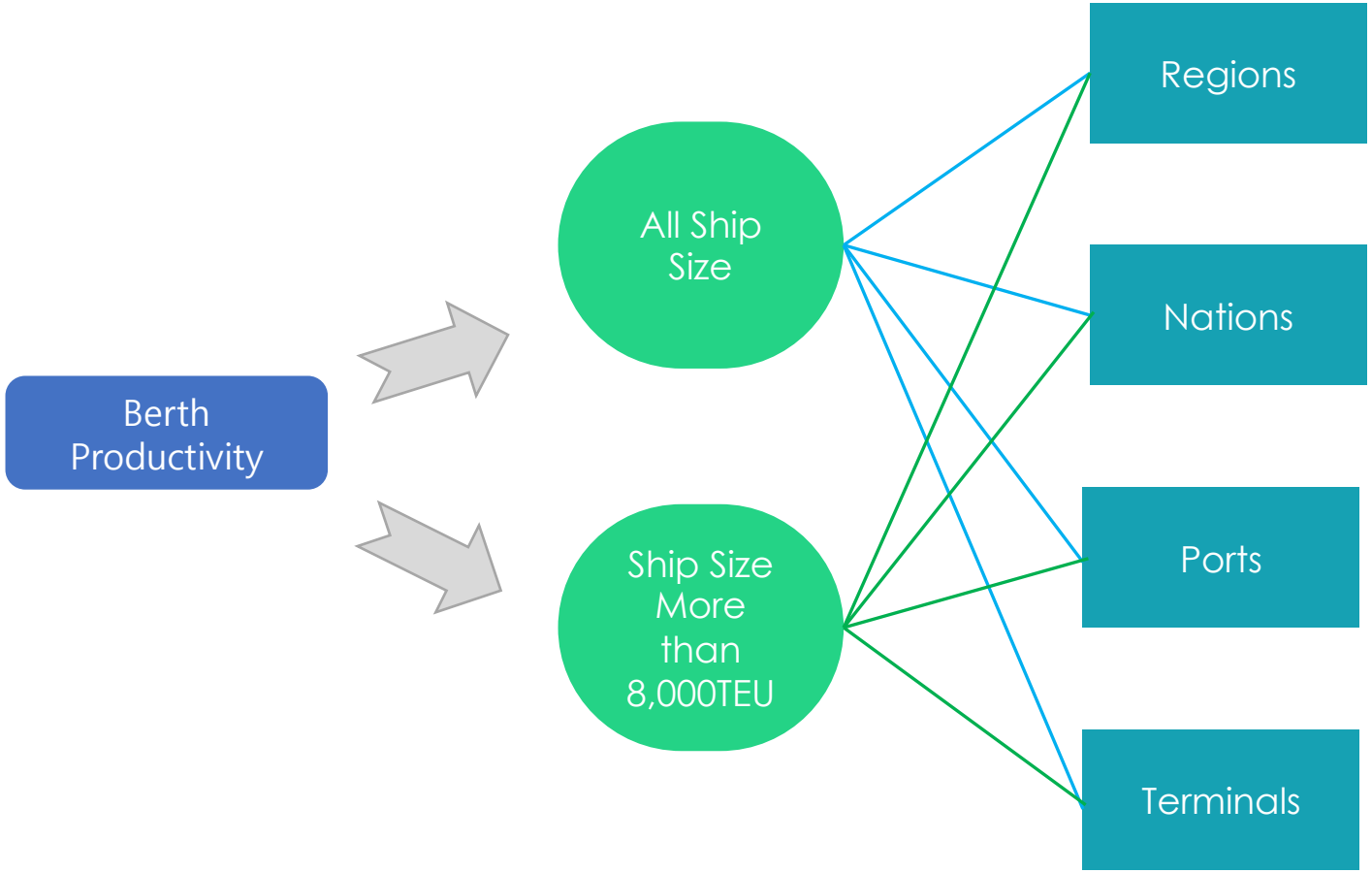
1. Longer ship calls at the terminal, higher cost

⇒ Terminal's productivity is a important consideration for shipping companies

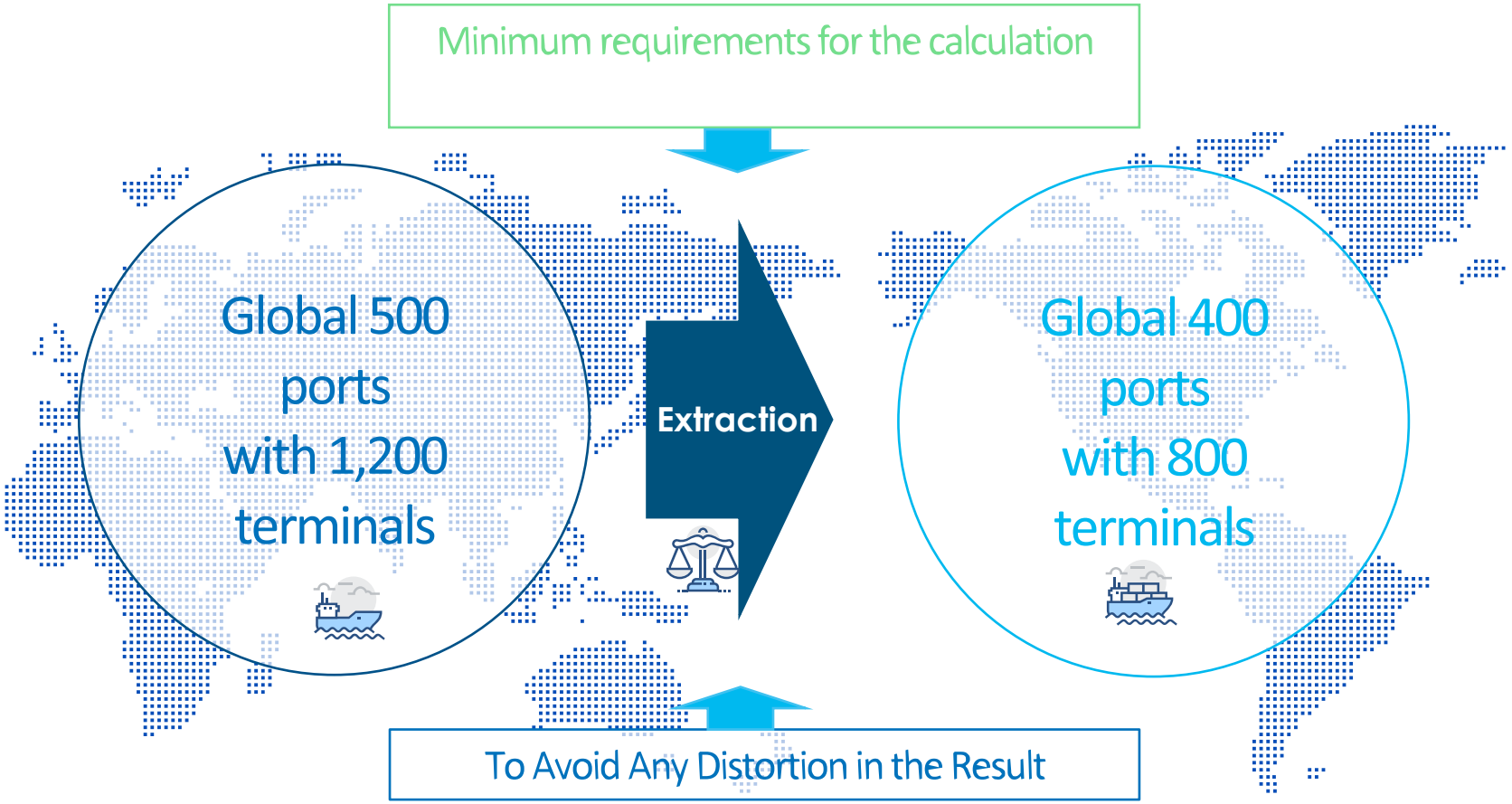
2. Do we have any index or methodology to evaluate the berth?



▪ Develop Berth Productivity Index



Data

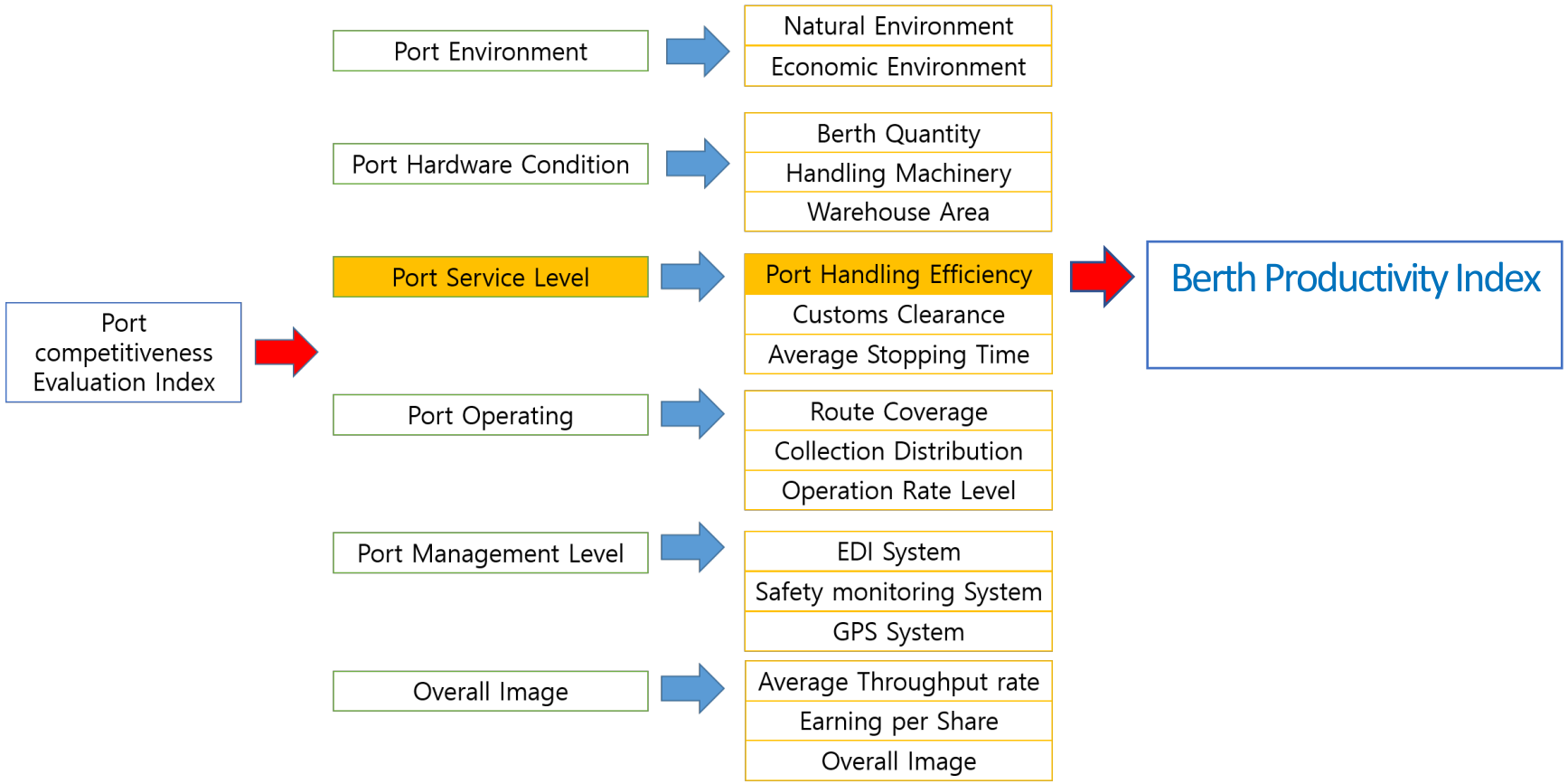

Minimum requirements for the calculation
Global 500 ports with 1,200 terminals
Extraction
Global 400 ports with 800 terminals
To Avoid Any Distortion in the Result

Analysis Data

Ship Size	2018	2019	2020	2021	2022	2023
All sizes	101,030	98,613	106,479	141,352	137,660	126,964
More than 8,000TEU	28,307	30,234	35,110	44,958	43,541	39,248
Proportion(more than 8,000TEU)	28.0%	30.7%	33.0%	31.8%	31.6%	30.9%

Country		2018	2019	2020	2021	2022	2023
1	CHINA	13,112	12,371	14,912	20,190	19,900	18,118
2	USA	7,867	8,217	8,538	9,877	8,860	8,199
3	MALAYSIA	4,565	5,159	5,287	5,853	5,827	5,196
4	SINGAPORE	4,196	4,193	4,265	5,378	5,640	4,877
5	JAPAN	2,766	3,919	3,907	5,012	5,059	4,459
6	KOREA (SOUTH)	4,835	4,909	2,743	4,486	5,093	4,366
7	SPAIN	3,649	3,711	3,642	5,115	4,610	4,239
8	BRAZIL	3,261	3,029	2,910	4,246	3,961	3,615
9	HONG KONG	2,885	2,662	2,898	3,591	3,529	2,844
10	TAIWAN	2,778	2,677	2,562	3,199	3,276	2,842
11	GERMANY	3,072	2,691	2,692	3,572	2,897	2,807
12	TURKEY	2,894	2,701	3,283	4,229	3,454	2,759

Berth Productivity Index



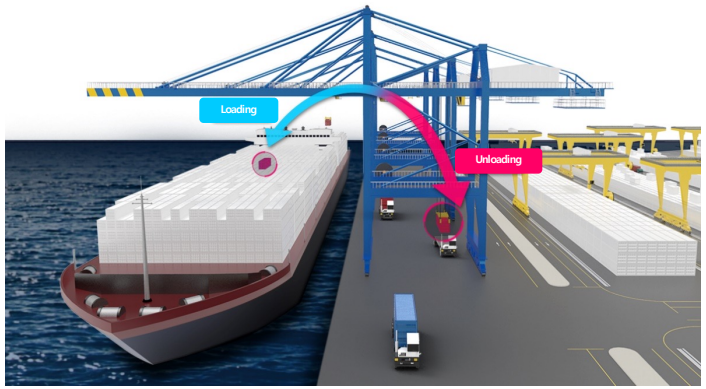
Source : Port competitiveness Evaluation Research based on ChernooffFAces Model(2013)

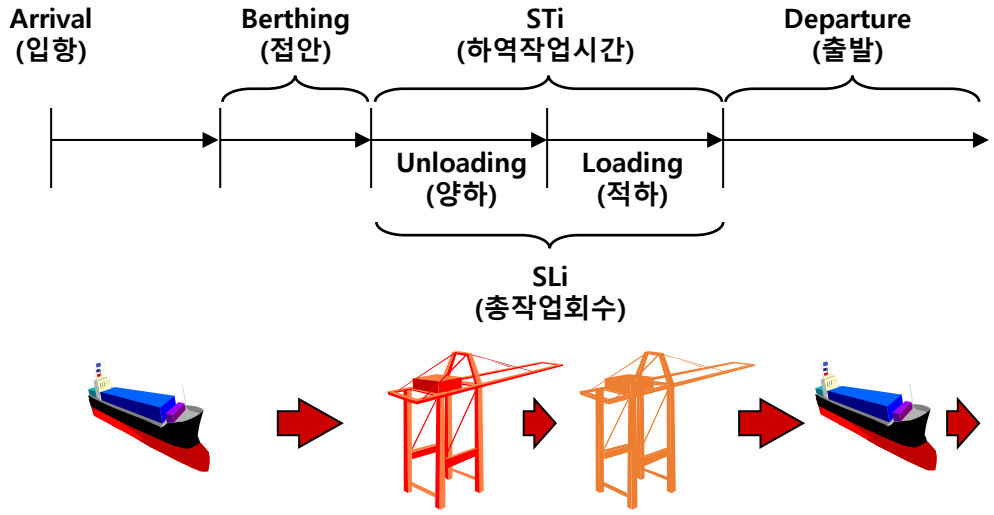
▪ Berth Productivity: unloading and loading lifts per hour per ship

Method of Calculation : total mean of each vessel's berth productivity
(number of total container lifts ÷ total time of unloading and loading)

- *i* : *ship number(i=1, 2, 3, ..., n)*
- *STi* : *Unloading and loading time for the ship i (from lifting at the first container to the last container)*
- *SLi* : *Number of Container Lifts during STi*
- *k* : *Terminal or Port or Country(k=1, 2, 3, ..., n)*
- *P(k)* : *Berth Productivity of Terminal(or Port or Country)'k'*

$$P(k) = \frac{\sum_{i=1}^{n} \frac{SLi}{STi}}{n}$$

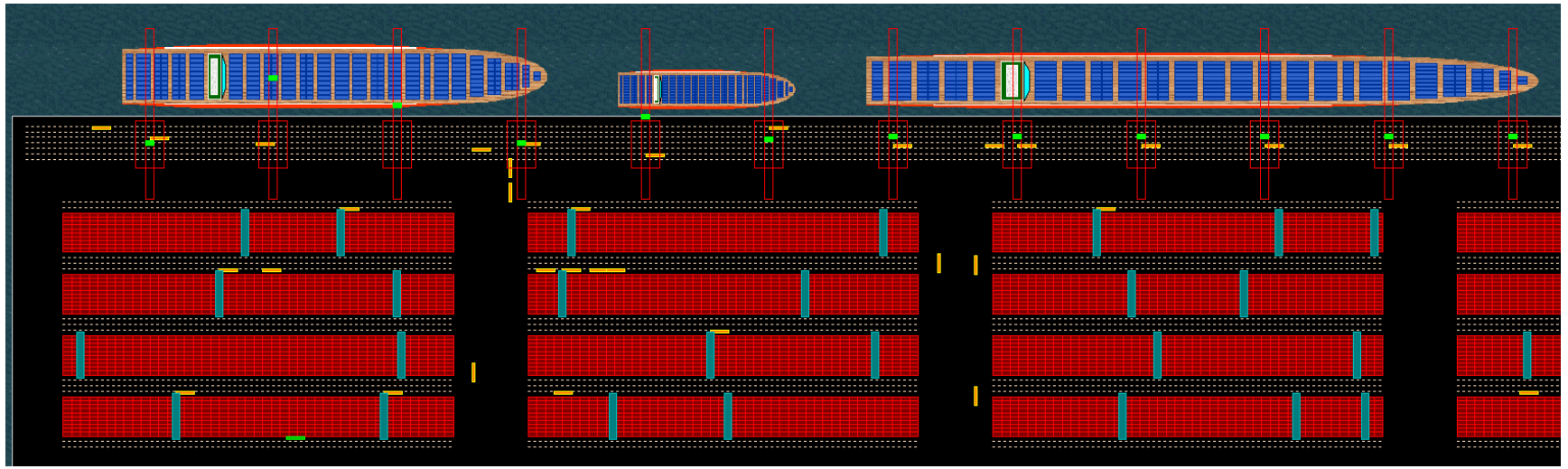




▪ Example of Berth Productivity

1. Total[All ship sizes] : (80+40+120) lifts/hr÷ 3 ships = 80 lifts/hr/ship
2. 8,000TEU and Larger : (80+120) lifts/hr÷ 2 ships = 100 lifts/hr/ship
3. Less than 8,000TEU : (40) lifts/hr÷ 1 ships = 40 lifts/hr/ship

Berth Productivity (Ship #1)	Berth Productivity (Ship #2)	Berth Productivity(Ship #3)
(20 x 4 = 80 lifts/hr/ship)	(20 x 2 = 40 lifts/hr/ship)	(20 x 6 = 120 lifts/hr/ship)
※ C/C assign. : #1~#4	※ C/C assign. : #5~#6	※ C/C assign. : #7~#12
Ship size : 9,200TEU	Ship size : 4,400TEU	Ship size : 23,756TEU



▪ Beth Productivity by Regions

☑ Average Berth Productivity by Region(All ships size)

Rank('23)	Regions	2021 [Rank]	2022 [Rank]	2023 [Rank]
1	North Asia	82.3 (1)	98.8 (2)	82.5 [1]
2	South/South East Asia	64.7 (2)	104.7 (1)	68.0 [2]
3	Middle East/Africa	55.8 (5)	91.0 (3)	59.8 [3]
4	North Europe	51.7 (6)	70.1 (5)	54.6 [5]
5	East Coast/Gulf North America	60.2 (3)	66.0 (6)	57.3 [4]
6	Mediterranean Region	47.9 (8)	74.2 (4)	52.8 [6]
7	Latin America	48.4 (7)	60.4 (7)	51.9 [7]
8	West Coast North America	56.2 (4)	54.3 (8)	45.7 [8]

▪ Beth Productivity by Nations

☑ Average Berth Productivity by Nation(All ships size)

Rank('23)	Nations	2021 [Rank]	2022 [Rank]	2023	Rank('23)	Nations	2021 [Rank]	2022 [Rank]	2023
1	OMAN	111.4(1)	111.6(1)	113.4	11	MALAYSIA	72.1(11)	75.5(9)	75.3
2	UNITED ARAB EMIRATES	102.4(2)	98.1(2)	96.7	12	KOREA (SOUTH)	71.8(12)	73.9(11)	73.2
3	CHINA	89.0(3)	86.0(4)	94.6	13	NETHERLANDS	65.7(16)	65.9(15)	70.3
4	INDIA	87.0(5)	86.9(3)	84.0	14	BELGIUM	61.4(19)	59.6(20)	66.7
5	SINGAPORE	77.9(8)	81.3(7)	81.7	15	HONG KONG	65.9(15)	65.9(16)	66.5
6	SRI LANKA	79.4(7)	78.9(8)	81.7	16	COLOMBIA	67.4(14)	69.7(13)	65.3
7	SAUDI ARABIA	86.9(6)	82.3(6)	81.0	17	PERU	58.6(25)	64.1(18)	64.2
8	QATAR	87.5(4)	83.5(5)	79.9	18	JORDAN	70.1(13)	63.1(19)	63.0
9	MOROCCO	73.8(10)	72.3(12)	79.8	19	EGYPT	58.1(26)	56.2(27)	61.4
10	VIETNAM	74.4(9)	75.4(10)	77.5	20	THAILAND	61.0(20)	66.1(14)	61.2

▪ Beth Productivity by Ports

☑ Average Berth Productivity by Ports(All ships size)

Rank('23)	Ports	2021 [Rank]	2022 [Rank]	2023	Rank('23)	Ports	2021 [Rank]	2022 [Rank]	2023
1	SALALAH	122.7(1)	119.1(1)	121.9	16	DAMMAM	93.5(11)	89.2(12)	85.4
2	QINGDAO	97.6(8)	96.0(10)	113.3	17	TANGER-MEDITERRANEAN	78.8(20)	77.4(24)	84.6
3	TIANJIN	100.4(6)	98.4(7)	112.3	18	JAWAHARLAL NEHRU PORT	87.1(16)	84.0(15)	84.0
4	YANGSHAN	108.2(3)	103.9(3)	110.4	19	MAWAN	73.8(26)	69.9(35)	83.3
5	CAI MEP	99.9(7)	104.4(2)	107.1	20	XIAMEN	75.0(24)	80.7(20)	81.9
6	PIPAVAV	103.2(5)	99.4(5)	106.4	21	SINGAPORE	77.9(22)	81.3(19)	81.7
7	KING ABDULLAH PORT	112.0(2)	94.6(11)	104.9	22	COLOMBO	79.4(18)	78.9(22)	81.7
8	KHALIFA PORT	96.0(9)	101.2(4)	101.1	23	DA CHAN BAY TERMINAL ONE	43.5(141)	59.4(66)	81.0
9	KAMARAJAR	80.6(17)	96.5(9)	98.7	24	JEDDAH	87.3(15)	82.6(18)	80.2
10	JEBEL ALI	106.9(4)	98.5(6)	95.4	25	HAMAD PORT	87.5(14)	83.5(16)	79.9
11	YANTIAN	78.6(21)	80.6(21)	92.3	26	LONG BEACH	60.6(64)	72.1(31)	79.5
12	MUNDRA	95.8(10)	96.6(8)	89.8	27	PORT SAID	70.8(31)	72.7(30)	78.8
13	TANJUNG PELEPAS	79.3(19)	84.5(14)	88.5	28	AARHUS	70.7(32)	59.9(64)	78.4
14	NINGBO	93.1(12)	84.7(13)	87.8	29	GUANGZHOU	76.9(23)	69.9(36)	77.7

▪ Beth Productivity by Ports

☑ Average Berth Productivity by Ports(ships size more than 8,000TEU)

Rank('23)	Ports	2021 [Rank]	2022 [Rank]	2023	Rank('23)	Ports	2021 [Rank]	2022 [Rank]	2023
1	TIANJIN	124.9(6)	139.1(1)	160.4	16	COLOMBO	99.8(17)	97.3(19)	103.2
2	TANJUNG PELEPAS	123.2(7)	132.4(2)	143.0	17	MAWAN	85.3(34)	79.9(38)	103.0
3	QINGDAO	121.6(8)	119.7(7)	140.7	18	YANTIAN	91.3(24)	93.2(20)	101.9
4	YANGSHAN	128.6(3)	125.9(5)	131.8	19	GUANGZHOU	92.9(21)	87.5(25)	100.7
5	DALIAN	89.8(28)	102.8(14)	131.3	20	XIAMEN	91.3(23)	98.2(18)	99.5
6	SALALAH	130.2(1)	131.9(3)	128.9	21	CARTAGENA (SPAIN)	97.5(18)	103.3(13)	98.8
7	TANGER-MEDITERRANEAN	107.9(12)	112.1(10)	121.4	22	JAWAHARLAL NEHRU PORT	102.8(6)	101.0(16)	98.8
8	CAI MEP	107.4(13)	114.7(9)	117.2	23	ZHOUSHAN	-(-)	82.0(34)	98.4
9	GDANSK	129.0(2)	124.3(6)	116.3	24	PORT SAID	81.7(41)	82.3(33)	97.3
10	KHALIFA PORT	111.8(10)	128.2(4)	115.1	25	AARHUS	90.5(27)	77.7(43)	97.2
11	SINGAPORE	105.8(14)	111.6(11)	113.5	26	ALGECIRAS	88.7(31)	93.0(21)	96.7
12	MUNDRA	112.8(9)	118.1(8)	112.2	27	PORT KLANG	95.1(19)	92.5(22)	94.9
13	JEBEL ALI	125.3(4)	110.5(12)	107.5	28	DAMMAM	105.7(15)	100.4(17)	94.1
14	NINGBO	111.1(11)	101.4(15)	105.0	29	CHIWAN	76.2(51)	80.3(36)	92.1
15	ROTTERDAM	86.3(33)	84.6(29)	103.9	30	SHEKOU	88.8(30)	82.4(32)	90.4

▪ Contributions and limitations of this study

☑ Contribution

Objective indicators	The berth productivity index developed in this study clearly has the advantage of measuring the productivity of many subjects at once and based on consistent criteria.
Intuitively and Empirically measure	The berth productivity index developed in this study can Intuitively and Empirically compare productivity of container ports and terminals.

deriving efficiency improvement factors in a short time → Enhancing port's competitiveness

☑ Limitation

1.Stronger theoretical backup

2. Enhance verification the berth Productivity Index

THANK YOU

감사합니다