Project No. - 5

PORT COMPETITIVENESS: A GLOBAL SHIPPING LINE PERSPECTIVE

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ABSTRACT

To analyze the competitiveness of container ports, it is crucially important to identify and characterize the key factors of competitiveness. Their relative importance depends on the location of the port, the situation in the market and it can be perceived differently by different groups of stakeholders. The aim of this study was to examine factors of global competitiveness of container ports as perceived by shipping lines. Data were collected from survey participants via a business-oriented social network. Two statistical methods were used to rank and group these factors: a Friedman test and a post-hoc analysis involving Least Significant Difference test (LSD). Shipping lines' decision makers need services of a high standard and with a low risk of labour-related disruptions to maintain their own high level of service quality. These strong views are held by decision makers of shipping lines with over 250 employees, while smaller organizations are more lenient on container terminal requirements. Survey results were also presented per continent, which clarifies any differences in importance of competitiveness factors based on geographical location. This may be useful for competitiveness gap analysis at a more granular level. Port operators and regulators should take these findings into account and address them in ports' strategic plans.

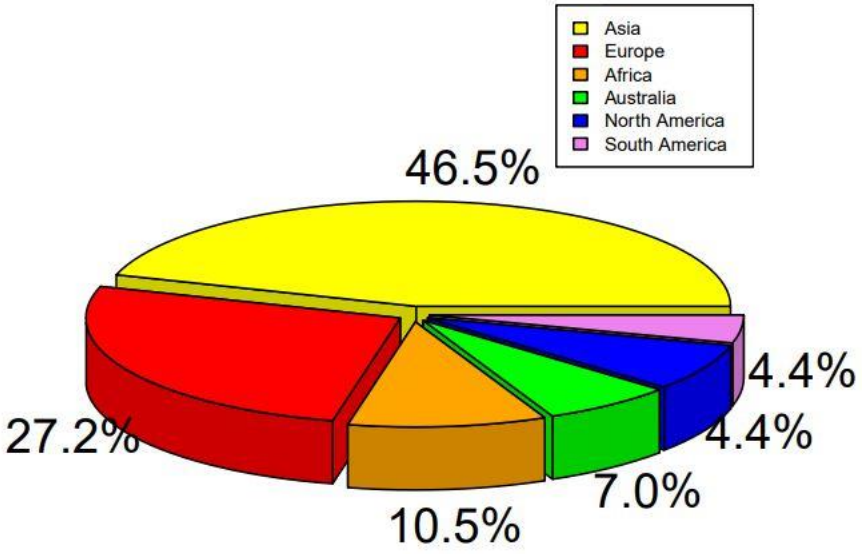
1.INTRODUCTION

Competitiveness of sea port is matter of interest of not only to the economists, but also businesses, governments and international organizations as it affects the country's economic and the sanctity of the international relations. Shipping lines function as a medium between shippers/freight forwarders and ports in terms of port choice. Shipping lines acts as broker between suppliers and customers. The shipping lines perspective on competitiveness factors is driven by their ever-stronger role as the party responsible for container terminal choice.

2.DATA COLLECTION

The list of potential respondents was prepared following two criteria. The first was shipping lines membership pursuant to Alphaliner's TOP 100 as of April 9, 2019, which includes active vessels in container liner services business. The second were those people who were senior

managers and directors in the shipping line companies and members of LinkedIn social network at the same time. A brief questionnaire in English language was distributed to these group members by invitation. They were asked to rate these factors from 1-10 by the order of their importance. A sorting was made from the responses that were collected and only 120 useful response were collected. Furthermore, these responses were categorised by the size of the company and the continent.



3. RESULTS

The 20 factors that are considered in this study were sorted according the mean rating they got from the responses in slide no. 29 in the presentation. From the table we get to know that the market offerings and the management of the terminal is the considered the most and on the other hand the ownership of the terminal was the least concerned issue. The mean difference between the adjacent factors were small but the difference between the first and the last factors was quite large. The order

of many factors in the list can stem from randomness of the sample, and the fact that in this sample factor A is higher placed than factor B does not mean that in the population of all shipping lines such order would be preserved. For this study, each respondent assessed the importance of each factor, so the primary analysis to test the significance of the differences in the average evaluation is a within-subjects repeated-measures analysis of variance (ANOVA).The null hypothesis in this test states that the distributions of ratings for all factors are the same, whereas the alternative hypothesis states that at least for one pair of factors the distributions are different.

4. FRIEDMAN TEST

$$X^2 = \frac{12}{nk(k+1)} \sum_{j=1}^{k} R_j^2 - 3n(k+1)$$

where:

R_j – the sum of ranks for factor j,
n – number of respondents,
k – number of factors (here: 20)

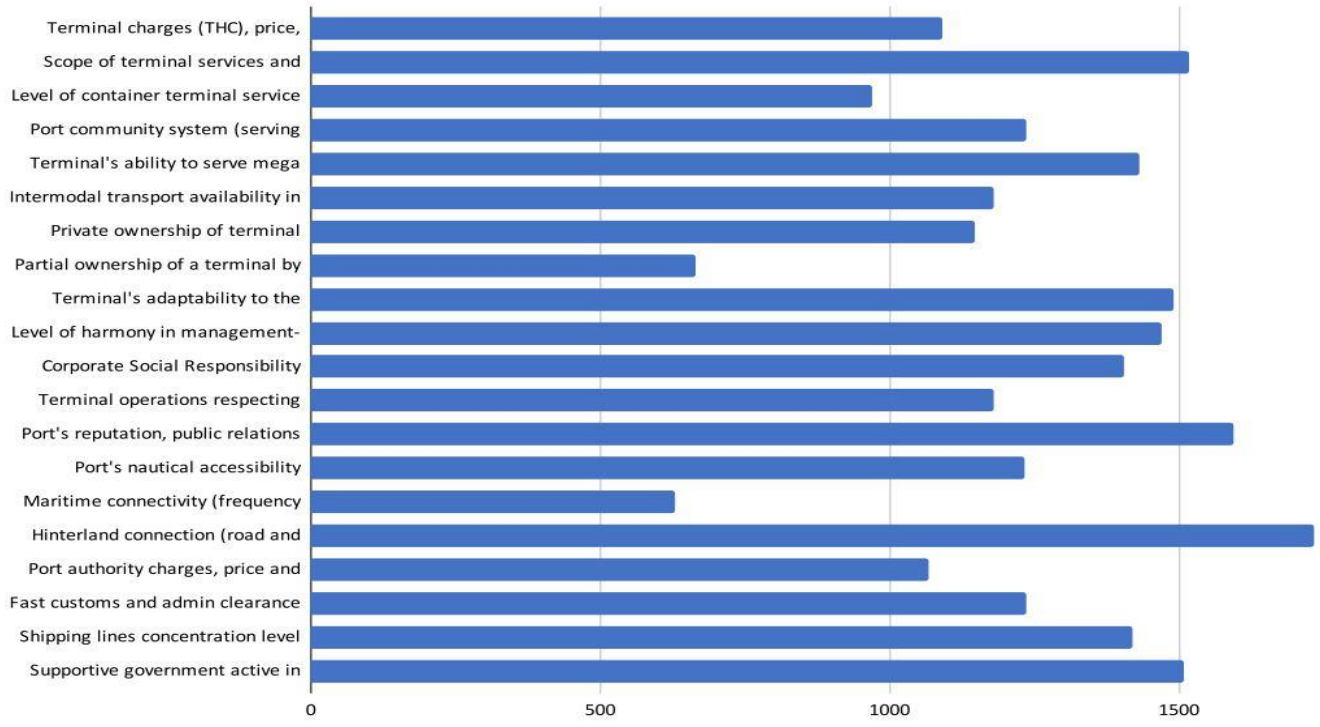
Under the null hypothesis the X^2 statistics has asymptotic chi-square distribution with (k-1) degrees of freedom.

The test results were: $X^2 = 426.84$, df = 19, $p < 0.0001$

This means that a null hypothesis should be rejected in favor of the alternative hypothesis, which says that the distributions of responses for some factors differ significantly. A post hoc analysis is necessary to determine which pairs of factors have statistically significantly different assessments.

5. POST HOC LSD TEST

The Post hoc LSD test results of the Friedman test was done and it is tabulated the slide no. 37.

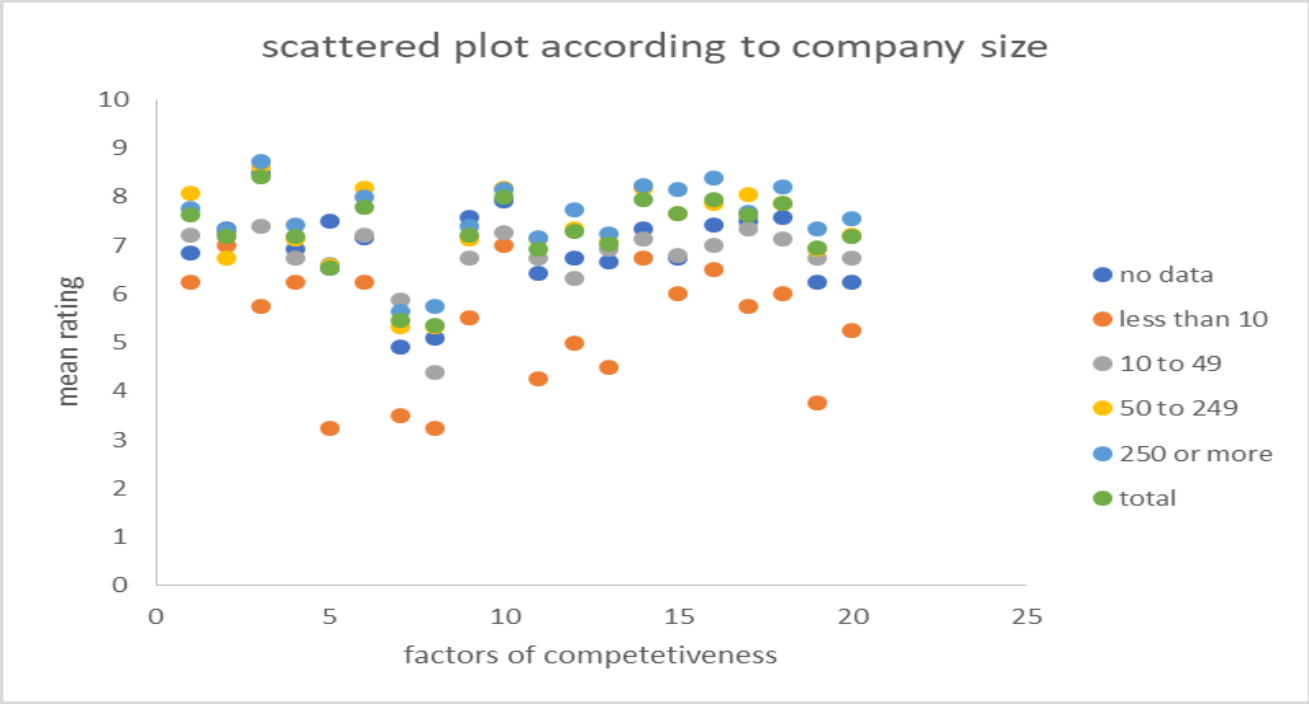


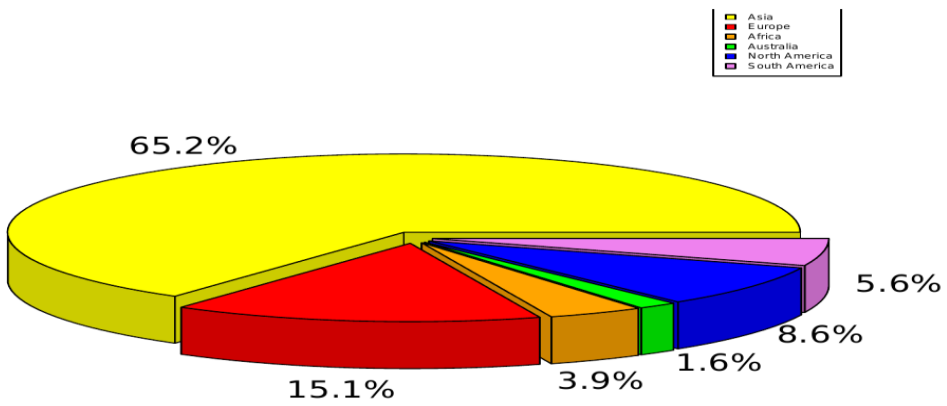
In the first two factors in the table (“Hinterland connection (road and rail networks, inland waterways)” and “Port's reputation, public relations and marketing”) have a common letter “a", which means that they are not statistically significantly different (although the difference between the rank sum is close to the LSD criterion and is 138).The second factor also has the letter “b", so it is not statistically significantly different than the next four factors, which also have the letter “b”. The first factor has only the letter “a", so with high confidence it can be said that “Hinterland connection (road and rail networks, inland waterways)” is a higher rated factor than eighteen factors from places 3rd to 20th.A distinct dividing line can be drawn between the 9th and 10th factor. The group of first nine factors can be further divided by separating the first two factors as the most

important and the other seven factors as important (each of these seven factors is assigned the letter “c", so their order between positions 3 and 9 is not relevant).The next eight factors, in places from 10th to 17th, can be considered as being of average-relevance, they are clearly rated lower than the first nine. In places from 18th to 20th, with the last two being particularly low-rated.

6. DISTRIBUTION WITH SIZE OF THE COMPANY

**the numbers given in the x-axis are the sl. no. of the factors given in slide no 52.





The two largest groups of companies were compared, i.e. of a number of employees between 50 and 249, and 250 and above. The Friedman test result for the first group of respondents is as follows:

$X^2 = 119.58$, df = 19, $p < 0.0001$

and for the second group:

$X^2 = 245.06$, df = 19, $p < 0.0001$

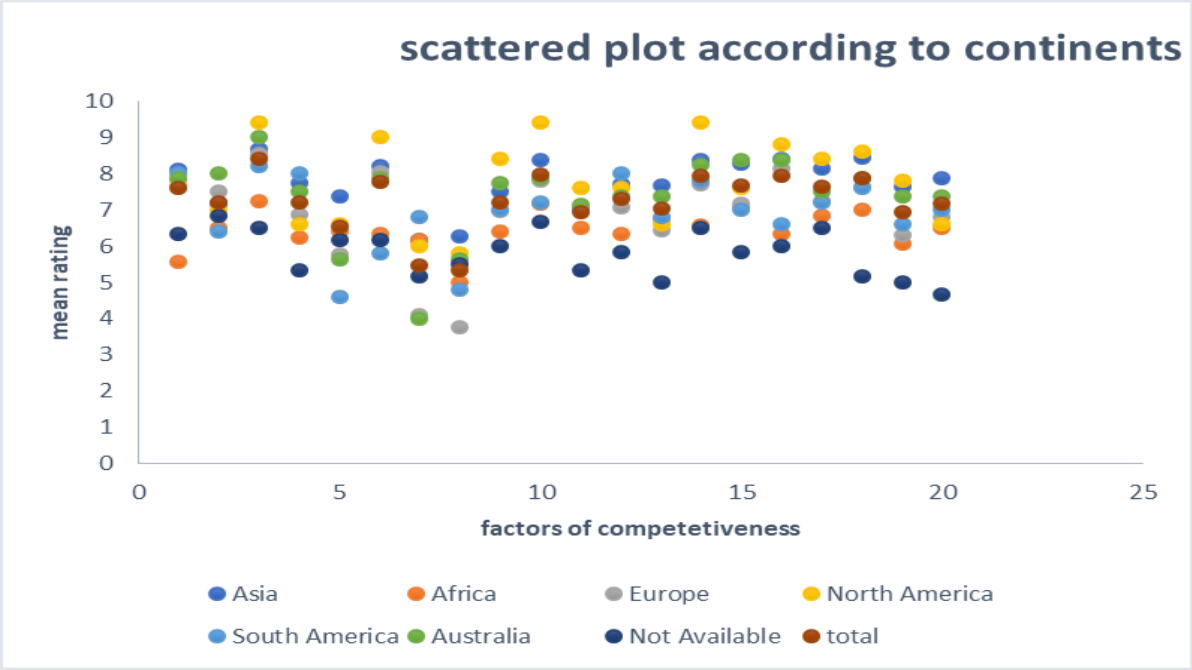
The critical values for the LSD test are 65.8 and 112.9 respectively.

Factors of competitiveness	50 to 249 person Rank sum	50 to 249 person Group	250 or more person Rank sum	250 or more person Group	difference
Hinterland connection (road and rail networks, inland waterways)		363a		943.5a	0
Supportive government active in promoting ports and logistics transport policies		283.5bcd		876.5ab	6
Scope of terminal services and logistic value added services		319ab		843.5ab	2
Shipping lines concentration level (M&A, alliances) and changes in shipping lines' preferences		276.5bcd		839ab	5
Port's reputation, public relations and marketing		325.5ab		831abc	-3
Terminal's adaptability to the changing market environment		294bc		828.5bc	0
Level of harmony in management-labour-government relationships (no strikes, conflicts and others)		322ab		783bcd	-3
Terminal's ability to serve mega container vessels (TEUs +18k)		318ab		725cde	-2
Corporate Social Responsibility (incl. business ethics, respect of natural environment and involvement with local communities)		322.5ab		719.5cdef	-6
Port community system (serving port clients, other stakeholders as well as inside container terminal)		233.5cde		713.5def	2
Terminal operations respecting natural environment protection laws		229.5cde		667.5efg	2
Port's nautical accessibility		235cde		642.5efg	-1
Fast customs and admin clearance of cargo, incl. port's regulations and customary duties		218.5de		634efg	2
Intermodal transport availability in the container terminal (by rail, inland waterways and roads)		225.5de		633.5efg	0
Private ownership of terminal		237.5cde		609.5fg	-5
Terminal charges (THC), price, rebates and other financial incentives		206e		599g	1
Port authority charges, price and pricing strategies		210.5e		572gh	-1
Level of container terminal service quality (speed, reliability, availability, security,non discriminatory access, eco-friendliness)		180.5ef		466hi	0
Partial ownership of a terminal by shipping lines		130fg		382.5ij	0
Maritime connectivity (frequency of shipping services)		110g		340.5j	0

The first factor (“Hinterland connectivity”) in both groups of respondents was in the first place (the same as for the whole sample), so the difference is 0.The ninth factor (“Corporate Social Responsibility (incl. business ethics, respect of natural environment and involvement with local communities)”) the difference is “-6”, because for medium-sized enterprises this factor is in eighth place, which is six positions lower in the ranking than for large enterprises where it is in the second position.

7. DISTRIBUTION WITH THE CONTINENTS

**the numbers given in the x-axis are the sl. no. of the factors given in slide no 52.



The perspective of respondents from Asia can possibly be driven by big vessel sizes that require high service levels, no disruptions and strong connections to both the hinterland as well as nautical accessibility. For respondents from Europe, the mean rating is lower, and importance of the other factors is decreasing fast. Questionnaires of respondents from Africa gave generally much lower mean ratings of factors, like political stability or smaller market size for globally traded goods. These lower rankings can also be seen as a potential area to invest in low-income countries that do not require that much capital per container terminal to improve competitiveness levels.

Due to the small sample size for some continents, the Friedman test was limited to the parts of the world with most sufficiently numerous responses, i.e. Asia and Europe.

The test result for Asia is as follows:

$X^2 = 200.67$, df = 19, $p < 0.0001$

And for Europe the following was obtained:

$X^2 = 193.17$, df = 19, $p < 0.0001$

In both cases, the test statistic is very high, indicating a difference in the rating distributions for the competitiveness factors. The critical values for the LSD test are 99.8 for Asia and 73.3 for Europe.

Factors of competitiveness	Asia Rank sum	Asia Group	Europe Rank sum	Europe Group	difference
Hinterland connection (road and rail networks, inland waterways)	734.5	a	485	a	0
Supportive government active in promoting ports and logistics transport policies	674	ab	449.5	ab	2
Level of harmony in management-labour-government relationships (no strikes, conflicts and others)	655	abc	434.5	abc	3
Port's reputation, public relations and marketing	708.5	ab	401.5	bcd	-2
Corporate Social Responsibility (incl. business ethics, respect of natural environment and involvement with local communities)	628.5	bcd	395	bcde	4
Scope of terminal services and logistic value added services	660	abc	391	bcde	-1
Terminal's adaptability to the changing market environment	708	ab	377	bcde	-4
Fast customs and admin clearance of cargo, incl. port's regulations and customary duties	476.5	efg	374	cde	8
Shipping lines concentration level (M&A, alliances) and changes in shipping lines' preferences	645	abc	353.5	def	-1
Terminal's ability to serve mega container vessels (TEUs +18k)	647	abc	344.5	def	-3
Port community system (serving port clients, other stakeholders as well as inside container terminal)	528	ef	329	defg	0
Port's nautical accessibility	498	efg	327	efg	2
Intermodal transport availability in the container terminal (by rail, inland waterways and roads)	530	def	300.5	fg	-2
Port authority charges, price and pricing strategies	410.5	gh	300.5	fg	4
Terminal operations respecting natural environment protection laws	563.5	cde	290.5	fgh	-5
Private ownership of terminal	519	ef	270	gh	-3
Terminal charges (THC), price, rebates and other financial incentives	497	efg	261	gh	-2
Level of container terminal service quality (speed, reliability, availability, security,non discriminatory access, eco-friendliness)	452	fg	220	h	-1
Maritime connectivity (frequency of shipping services)	266	i	107	i	1
Partial ownership of a terminal by shipping lines	328.5	hi	99	i	-1

The most important factor of competitiveness according to shipping lines is the “Hinterland connectivity” in Asia and Europe. The second most important factor in overall results, i.e. “Port's reputation, public relations and marketing”, is perceived to be somewhat more important by the shipping lines from Asia, where it is also placed second, than by the shipping lines from Europe, where it took fourth place.

8. LIMITATION AND DRAWBACKS

- The results of this study are limited by the sample size of LinkedIn users and non-random selection process.
- Another limitation is lack of control over respondents during answering of questions, which can introduce bias.
- As invitations were sent out only to a selected target audience, identified by their name, company and current position, risk of participation by non-targeted respondents has been reduced.
- Due to the small sample size for some continents, the test was limited to the parts of the world with most sufficiently numerous responses, i.e. Asia and Europe.

FINAL REPORT

This wide range of factors could be a result of high level of economic value being transported on such units, compared to small organizations, which are more likely to utilize small feeder vessels and have limited geographic reach. Requirements for container terminals in terms of competitiveness factors like service level, smoothness of port operations (avoidance of disruptions) and flexibility to accommodate exchange of more containers per vessel, are growing. Among 20 researched factors

only the first 9 play a key role, and especially so the level of container service quality. This holds true as the number one factor i.e. Hinterland connectivity regardless of company size (big or medium) and geographical location (Asia or Europe). This study adds to the results of other competitiveness studies on the perceptions of shipping lines' decision makers, both those with global and with regional focus.

REFERENCES

Supplementary data to this article can be found online at https://doi.org/10.1016/j.marpol.2020.103896.

[1] https://doi.org/10.1016/j.tre.2008.02.004.

[2] https://doi.org/10.1080/0003684050043887 1.

[3] https://doi.org/10.1080/13675560310001626990.

[4] https://doi.org/10.1057/palgrave. mel.9100158.

[5] https://doi.org/10.1057/palgrave.mel.9100093.