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Systematic Review of Port Choice Criteria for Evaluating Port Attractiveness Determinants (Part II): Introducing the PACS Model/Tool

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ABSTRACT

This paper serves as the continuation and conclusion of the systematic literature review (SLR) conducted in Part I, which focused on bibliometric and content analysis to explore port attractiveness. In this Part II, two key objectives are pursued: first, to identify and list the items that evaluate the nine Port Attractiveness Determinants (PADs), which were thoroughly discussed in Part I. Second, this Part II introduces the Port Attractiveness and Customer Satisfaction (PACS) Model/Tool, as outlined in the earlier part of the study. This holistic conceptual framework, developed specifically for port attractiveness, represents the culmination of this two-part study by providing a structured approach that consolidates the diverse criteria identified in studies on port choice, port selection, and port competitiveness. Based on a manual screening of 87 references—obtained through an SLR process and published between 1970 and 2022—116 attributes were identified and analyzed to evaluate the nine PADs. By addressing a significant framework gap in the literature, the PACS Model/Tool integrates theoretical rigor with practical applicability. Its core pillars are adaptable and contextualizable, allowing for application in other complex territorial contexts, such as train stations, airports, municipalities, regions, or nations. Ultimately, the goal of this study's findings, through its two components—Part I and Part II—is to contribute to the advancement of academic knowledge on port development strategies while equipping decision-makers with actionable tools to tackle multifaceted challenges across diverse territorial settings.

1 Introduction

In contemporary times, the interaction between port an d maritime professions has created a dynamic ecosystem, rich with a variety of actors, professions, methodologies, and disciplines. Originally consisting of two main components, 'Port' and 'Sea,' this ecosystem has nowadays expanded to include 'Land,' increasing its scope and complexity. The port, at the heart of this ecosystem, acts as a connecting point between various transportation modes, including maritime and land transport, thus enabling efficient and effective distribution networks [1]. Recent studies and reports highlight several factors contributing to port attractiveness and the performance of the maritime ecosystem [2]. Also, the port serves as a crucial hub, drawing in goods and passengers. This central role of the port is key to the concept of *port attractiveness*, which is the focus of this study.

Port attractiveness refers to the extent to which a port's characteristics resonate with and appeal to its current and potential stakeholders. The measurement of this attractiveness is contingent upon evaluating the port's attributes from the stakeholders' perspectives. However, this evaluation process becomes increasingly complex as the number and variety of interactions with-

in the port ecosystem grow. This complexity is inherently linked to the diversity of traffic types managed by the port. For instance, assessing the attractiveness of a marina is comparatively straightforward compared to a container port, while the evaluation of a multi-purpose port handling diverse cargo types presents even greater challenges. As the number of interactions increases, involving a broader and more heterogeneous group of stakeholders, the intricacy of evaluating port attractiveness correspondingly escalates.

The initial challenge in evaluating port attractiveness lies in identifying what should be measured. Specifically, which characteristics of a port contribute to its attractiveness and how do these characteristics vary based on its typology? A comprehensive review of the literature revealed a notable scientific gap, with existing methodologies being fragmented and lacking coherence. To address this issue, we propose a holistic framework that integrates multiple attributes into nine Port Attractiveness Determinants (PADs) **[3]**—collectively termed the "9Ps of Port" **[4]**. This model is versatile and can be universally applied across all port types while also being adaptable to analogous transport contexts, such as airports, railway stations, and bus terminals.

Moreover, beyond serving as a strategic tool for port, maritime, railway, airport, or simply territory development managers, this model is further extended in this study through the introduction of a complementary concept—which is Customer Satisfaction, to this framework: the PACS Model, which stands for *Port Attractiveness and Customer Satisfaction*. This theoretical construct offers valuable insights for decisions makers in these industries, specifically marketers, that focus on enhancing customer satisfaction and align strategic priorities with stakeholder needs. These dual contributions aim to provide a solid theoretical and practical foundation for advancing research in port development strategies and management practices in transportation and logistics sectors in general.

Building on the preceding discussion, this study encountered a critical theoretical challenge concerning the philosophical differentiation between the concepts of *competitiveness* and *attractiveness*. Although distinct both theoretically and etymologically, our literature review indicates that the criteria used to evaluate these concepts are often similar. This overlap has sparked intense academic debate, necessitating further exploration and refinement.

To navigate this complexity, it is important to note that enhancing a port's *attractiveness* is theoretically instrumental in strengthening its *competitiveness*. The key distinction lies in the underlying dynamics of these concepts: *competitiveness* inherently presupposes the existence of competition among entities, whereas *attractiveness* emphasizes collaboration and cooperation among stakeholders. Furthermore, *competitiveness* is intrinsically comparative, requiring a benchmark or reference point to evaluate performance. *Attractiveness*, by contrast, does not inherently involve comparison, although it can be assessed comparatively in practice.

Meanwhile, a significant characteristic of *attractiveness* is its strong territorial anchoring, as it pertains to the unique attributes of a specific location or entity. This uniqueness applies to a wide range of contexts, including ports, airports, train stations, bus terminals, stadiums, municipalities, provinces, or even nations. By examining these nuances, this study contributes to the broader discourse on port development and stakeholder engagement, offering a more nuanced understanding of *how attractiveness* and *competitiveness* intersect in diverse territorial contexts.

In fact, the study of port choice is inherently complex, encompassing a multitude of factors that influence decision-making processes. These choices are primarily driven by a port's perceived desirability and suitability for investment, commercial operations, shipping, and logistics activities. Notably, the absence of a comprehensive theoretical framework for analyzing port and maritime attractiveness and competitiveness—particularly within the domains of port development strategy and port marketing—has prompted researchers to adopt diverse methodologies. In response to this gap, we propose a holistic, hybrid model designed to be universally applicable across territories aiming to enhance their attractiveness and competitiveness. Nonetheless, this research specifically focuses on the port and maritime industries.

As an extension of Part I of this study, Part II aims to address the generic questions that stem from the central question formulated in Part I, namely: "*What are the determinants of port attractiveness?*" Accordingly, the generic questions pertinent to this Part II of the Systematic Literature Review (SLR) are as follows: (i) "*What attributes are used to evaluate the nine Port Attractiveness Determinants (PADs)?*" (ii) "*How, if any, is the relationship between port attractiveness and customer satisfaction represented in the literature?*" and (iii) "*Is it possible to propose a holistic and unified conceptual framework that can be adapted and contextualized to enhance the appeal of a place or destination?*".

To address editorial constraints, this study has been divided into two parts. However, this Part II is not a case of "salami-slicing" but an extension of Part I. It builds upon the findings of the SLR by conducting a complementary analysis, identifying 116 attributes that evaluate the nine PADs, and introducing the holistic PACS Model. This approach aligns with the guidelines of reputable scientific journals (**Table 1**) indexed by leading publishers and databases, ensuring high-quality content and scientific rigor.

Table 1 Examples of scientific papers divided in two parts

Journal of publication	SJR H-index	Author(s)	Year	Article title
Maritime Studies and Management[1]	71	Griffiths [5]	1976a	Optimal handling capacity at a berth
		Griffiths [6]	1976b	Unloading facilities at an iron-ore terminal
Maritime Policy & Management		D'este and Meyrik [7]	1992	Carrier selection in a RO/RO ferry trade Part 1. Decision factors and attitudes
		D'este [8]	1992	Carrier selection in a RO/RO ferry trade Part 2. Conceptual framework for the decision process

Finally, Part II emphasizes the importance of understanding port attractiveness through the lens of client perceptions. This involves identifying the port's key clients and their activities as the "*unit of analysis*" **[9]** as a preparatory step in applying the PACS Model. By linking port attractiveness to customer satisfaction, this study proposes actionable insights while addressing critical gaps in the literature.

2　Materials and Methods

Part I of this study **[3]** outlined the methodology employed. Building on this foundation, the purpose in this section of this Part II is to provide additional insights (**Figure 1**), equipping researchers with the necessary Materials and Methods tools to replicate this experiment and ensure its applicability in other contexts.

As a reminder, the mainly objective is to propose a holistic conceptual model that is as comprehensive as possible and adaptable to all ports and/or port terminals seeking to expand their activities while tackling into account their territorial parameters. To achieve this, we followed a 10-step process. **Figure 1** summarizes this entire process, starting from the initial query *(Step 0)* conducted on *Elsevier*'s *Scopus* database, to the inclusion of *Scopus*-unindexed papers *(Step 8)*. These latter references were searched on the *Google Scholar* search engine. *Google Scholar* includes a vast array of publications in its database, ranging from high to low quality journals, as well as working papers and conference proceedings. By comparison, *Scopus* provides a middle ground between the extensive coverage offered by *Google Scholar* and the selective approach of *Web of Science*. *Scopus* includes a broader range of journals than *Web of Science* yet still emphasizes maintaining a quality threshold **[10]**. Despite these differences, both *Scopus* and *Web of Science* are predominant databases utilized in SLRs, although researchers may also consider data from other platforms like *Google Scholar* for a more comprehensive view **[11]**. Regarding the other stages of the sampling process, **Figure 1** provides a more detailed explanation of the adopted choices, including the inclusion and exclusion criteria.

The final list of papers retained (n=87) were imported into the software *Zotero*. This is crucial for subsequent analyses of indicators, such as co-citations or co-authorship in scientometric or bibliographic analysis, or in analysing the content of abstracts and titles. In parallel, an MS Excel sheet was created, cross-referencing:

i.　120 identified references, including the 87 used for the study; and

ii.　15 classification criteria.

On the one hand, the 120 references include 99 papers published by *Scopus*-indexed journals and the 21 non-*Scopus*-indexed papers. On the other hand, the 15 classification criteria: Year of the publication; Author(s) of the paper; Type of Paper; *Google Scholar* Citation Number; Journal title of the publication; *Scimago Journal H-Index (SJR)*; Editor/Publisher; The paper's hosting search engine; Language of the paper; Case Studied (Port or Terminal); Country; Continent; Papers' data sources and/or the studied perspectives; Method/tool used/Approach; Traffic type.

It should be noted that all data were entered manually to reduce the margin of technical errors related to formatting and to complete certain information that the machine cannot collect, or simply because the paper does not cite the sought information that is important for data analysis. For example, the country or continent. Many of our references mention the case of the port or terminal studied but do not specify the country or continent to which the port or terminal belongs **[12-15]**.

Manual content analysis is a rigorous method for examining qualitative data, as outlined by Mattimoe *et al.* **[16]**, which highlight the advantages of manual analysis over computerized methods. This approach allows for a more intimate and detailed understanding of the data, enabling researchers to identify subtle themes and patterns that automated tools might overlook.

According to Krippendorff **[17]** and Saldaña **[18]**, the manual approach ensures that the researcher remains closely engaged with the data, which is critical for accurately identifying the items that measure port attractiveness. Basit **[19]** highlight that manual coding is particularly valuable for early-stage research where researchers need to develop a grounded understanding of

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[1]　later named *Maritime Policy & Management.*

STEP 0 — **Initial Query**

(TITLE-ABS-KEY ('port AND attractiveness' OR 'port AND competitiveness' OR 'port AND selection' OR 'port AND choice'))

Irrelevant result due to containing a batch of papers outside the study's scope. However, using the Snowballing method and reformulating the query allowed the study to continue

STEP 1 — **Periods inclusion**

1970 - 2022

First result following the refinement of the initial query (Query 0)
(n = 157)

STEP 2 — **Keywords and Query 1**

(TITLE-ABS-KEY ('attractive*' OR 'competitive*' OR 'selection', OR 'choice') AND TITLE-ABS-KEY ('port*' OR 'seaport' OR 'criteri*' OR 'factor*' OR 'determinant*'))

STEP 3 — **Languages and Query 2**

(TITLE-ABS-KEY ('attractive*' OR 'competitive*' OR 'selection', OR 'choice') AND TITLE-ABS-KEY ('port*' OR 'seaport' OR 'criteri*' OR 'factor*' OR 'determinant*')) AND (LIMIT-TO (LANGUAGE , "English"))

Non-English papers excluded
(n = 151)

STEP 4 — **Paper types and Query 3**

(TITLE-ABS-KEY ('attractive*' OR 'competitive*' OR 'selection', OR 'choice') AND TITLE-ABS-KEY ('port*' OR 'seaport' OR 'criteri*' OR 'factor*' OR 'determinant*')) AND (LIMIT-TO (LANGUAGE , "English")) AND (LIMIT-TO (DOCTYPE , "ar") OR LIMIT-TO (DOCTYPE , "cp") OR LIMIT-TO (DOCTYPE , "ch") OR LIMIT-TO (DOCTYPE , "re"))

All types of papers were included in the selection, which consists of: 'Articles (119),' 'Conference Papers (26),' 'Book Chapters (3),' and 'Reviews (3).' Consequently, the total count of papers did not change.

(n = 151)

STEP 5 — **Subject Area and Query 4**

(TITLE-ABS-KEY ('attractive*' OR 'competitive*' OR 'selection', OR 'choice') AND TITLE-ABS-KEY ('port*' OR 'seaport' OR 'criteri*' OR 'factor*' OR 'determinant*')) AND (LIMIT-TO (LANGUAGE , "English")) AND (LIMIT-TO (DOCTYPE , "ar") OR LIMIT-TO (DOCTYPE , "cp") OR LIMIT-TO (DOCTYPE , "ch") OR LIMIT-TO (DOCTYPE , "re")) AND (EXCLUDE (SUBJAREA , "AGRI") OR EXCLUDE (SUBJAREA , "EART") OR EXCLUDE (SUBJAREA , "PHYS") OR EXCLUDE (SUBJAREA , "BIOC") OR EXCLUDE (SUBJAREA , "CHEM") OR EXCLUDE (SUBJAREA , "ARTS") OR EXCLUDE (SUBJAREA , "VETE") OR EXCLUDE (SUBJAREA , "CENG") OR EXCLUDE (SUBJAREA , "MATE"))

Nine subject area were excluded as they were considered outside the scope of our study, namely: Agricultural and Biological Sciences 'AGRI,' Biochemistry, Genetics, and Molecular Biology 'BIOC,' Earth and Planetary Sciences 'EART,' Physics and Astronomy 'PHYS,' Materials Science 'MATE,' Chemistry 'CHEM,' Chemical Engineering 'CENG,' Veterinary 'VETE,' and Arts and Humanities 'ARTS.'

(n = 131)

STEP 6 — **Abstract examination**

Manual screening

32 were excluded for falling outside the study's focus on port attractiveness and competitiveness.
(n = 99)

STEP 7 — **Full text examination**

24 papers were excluded for their narrow focus on specific maritime and port industry aspects.
(n = 75)

Scopus-unindexed papers
(n = 21)

STEP 8 — **Reducing Bias**

Excluded papers
(n = 9)

Unpublished article (n = 1)

Inaccessible articles (n = 2)

Out of Scope
(n = 6)

Included papers
(n = 12)

Research articles
(n = 3)

Thesis (n = 3)

Book (n = 1)

Book Chapters
(n = 3)

Working/Conf. Papers
(n = 2)

Final list of Scopus-unindexed papers
(n = 12)

Final list of Scopus-indexed papers
(n = 75)

Final list retained for the literature review
(n = 87)

Manual step of extracting determinants of port attractiveness and their attributes through in-depth analysis of the sampled studies
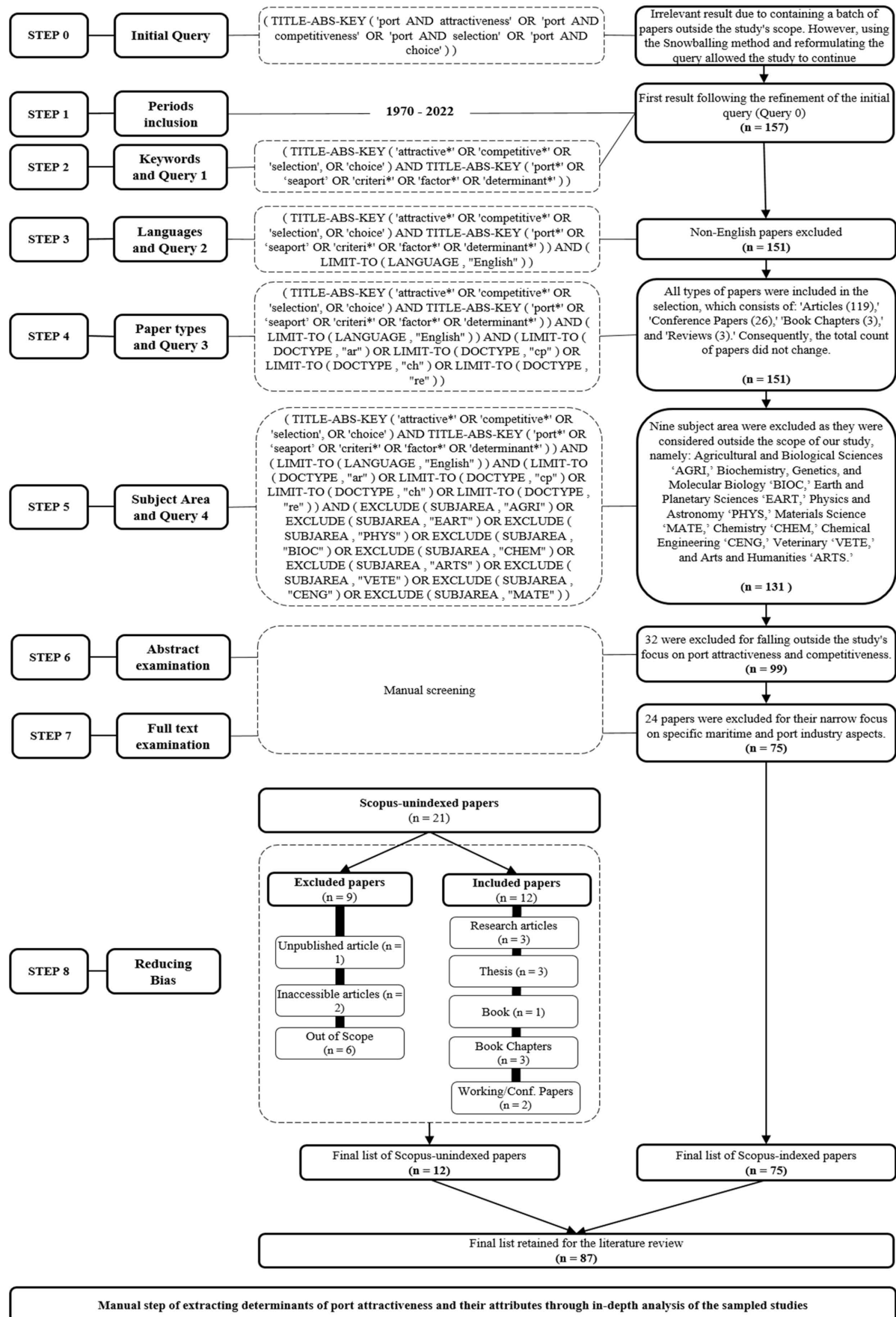
Figure 1 Detailed Sampling Process

the data without being influenced by the biases that software algorithms might introduce.

That said, the databases used in *Zotero* and *MS Excel* constitute the source files for the analytical approach of the sample. This approach involved selecting indicators classified by researchers as scientometric and/or bibliometric based on their similarities. In a subsequent step, content analysis was carried out using software (i.e., *VOSviewer*, *MS Excel*, *Zotero*, *Scimago Graphica*) before moving on the manual content analysis aiming to identify the items measuring port attractiveness to get the holistic model.

3   Results and analyses

To complement the initial findings presented in Part I of this study **[3]**, this section of Part II provides a more comprehensive analysis of the study's sample. These extended results and analyses are essential to establish the scientific foundation of the papers used to extract the 116 attributes. For this purpose, *Section 3.1* details the sample characteristics, referred to as **Sample Form and Influence Analysis (SFIA)**, whose objective is mainly to analyze the influence of the 87 papers from which the attributes measuring the nine PADs are extracted. Next, *Section 3.2* presents the extraction process conducted through a rigorous manual content analysis, termed hereafter **Sample Substance and Insights Analysis (SSIA)**. This analysis delves into significant terminological and semantic complexities to accurately define the attributes measuring the Port Attractiveness Determinants (PADs)

In this context, the section integrates both bibliometric and content-based findings. While the bibliometric analysis relies on straightforward quantitative indicators, the content analysis is conducted through meticulous manual exploration of the sample texts, ensuring the reliability and depth of the results. Together, these analyses offer a robust foundation for understanding the relationships between the extracted attributes and the determinants of port attractiveness.

3.1 Sample Form and Influence Analysis (SFIA)

As a prelude to the findings that follow, a general analysis of the sample, focusing on citations per publication (**Table 2**), is presented to offer an initial under-

standing of the academic impact and influence of the corpus that underpins the methodological foundation of this manuscript.

The findings reveal that the 87 references analyzed in this study, published across 43 Journals, have garnered a cumulative total of 13,099 citations, resulting in an average of 150.56 citations per publication. This substantial citation count highlights the strong scientific foundation of this research, reflecting the significant impact and academic reach of the works included in the sample.

This initial phase of the *Sample Form and Influence Analysis (SFIA)* establishes a foundation for further exploration of the sample through five key dimensions of micro-analysis: Journal, Author, Type of Paper, Top influential Editors/Publishers, and Editors distribution. These subsequent steps are designed to provide in-depth insights into the scientific influence of the sample utilized in this systematic literature review.

3.1.1 Journal analysis

As detailed in the methodology section, the sample includes a combination of *Scopus*-indexed and non-*Scopus*-indexed publications. To mitigate potential biases and ensure objectivity in the interpretation of results, **Table 3** provides an overview of the top Publishers of the 87 references, ranked by the number of publications. Alternatively, **Table 4** presents a ranking of references based on the H-Index derived from the *Scimago Journal Rank*, which inherently excludes non-*Scopus*-indexed references, ensuring a clear distinction in the evaluation of the sample's scientific impact.

The analysis reveals, as highlighted briefly in Part I, that *Maritime Policy and Management* leads with 21 publications and 4,247 citations (202.23 per publication), followed by *Maritime Economics and Logistics* with 14 publications and 2,761 citations (197.21 per publication). Notably, *Transportation Research Part A* and *Part E* exhibit the highest citation rates, at 588.5 and 454.5 citations per publication, respectively. *Energy Policy* ranks highest in the SJR index (234) with one publication (254 citations), followed by *Applied Mathematics and Computation* (SJR 154, 241 citations). While journals with higher publication counts tend to achieve greater total citation volumes, this trend is not absolute, as journal quality and impact also significantly influence citation metrics, as illustrated in **Table 4**.

Table 2 Sample Citation Analysis (n=87)

Sample Citation Analysis (n=87)	Number of Journals/ Editors	Number of Publications	Total Citations based on *Google Scholar*	Average Citation per Publication
Scopus-Indexed	32	75	12,501	166.68
Non-*Scopus*-Indexed	11	12	598	49.83
Whole Sample	43	87	13,099	150.56

Table 3 Top Editors by number of publications (n=87)

Rank	Journal (Editor)	Number of Publication	Total Citations based on *Google Scholar*	Average Citation per Publication
1	*Maritime Policy and Management*	21	4,247	202.23
2	*Maritime Economics and Logistics*	14	2,761	197.21
3	*Transportation Journal*	4	401	108.5
4	*Transportation Research Part A*	2	1,177	588.5
5	*Transportation Research Part E*	2	909	454.5
6	*Transport Reviews*	2	425	212.5
7	*Transport Policy*	2	217	108.5
8	*The Blackwell Companion to Maritime Economics (Book Chapters)*	2	137	68.5
9	*Pomorstvo - Scientific Journal of Maritime Research*	2	54	27
10	*Maritime Business Review*	2	33	16.5
11	*Case Studies on Transport Policy*	2	2	1
12	The rest : 32 Journals and Editors with one publication each	32	2736	85.5
Total	**43 Journals and Editors**	**87**	**13,099**	**150.56**

Table 4 Top ranked Journals according to the H-index of *Scimago Journal Rank* (n=75)

Rank	Journal (Editor)	SJR Index	Number of Publication	Total Citations based on *Google Scholar*	Average Citation per Publication
1	*Energy Policy*	234	1	254	254
2	*Applied Mathematics and Computation*	154	1	241	241
3	*Transportation Research Part A*	142	2	1,177	588.5
4	*Transportation Research Part E*	122	2	909	454.5
5	*Journal of Transport Geography*	118	1	184	184
6	*European Journal of Marketing*	110	1	96	96
7	*Marine Policy*	104	1	335	335
8	*Transport Policy*	103	2	217	108.5
9	11 Journals	100 ≥ SJRi ≥50	45	8,356	185.68
10	13 Journals	49 ≥ SJRi ≥ 5	19	732	38.52
Total	**32 *Scopus*-Indexed Journals**	**234 ≥ SJRi ≥ 5**	**75**	**12,501**	**166.68**

3.1.2 Author Analysis

In complement to the findings presented in the results section of Part I, the analysis of **Table 5** highlights that the top 14 authors account for 51.36% of the total citations, emphasizing the concentration of influence among a subset of highly cited works. Key contributions include Notteboom and Rodrigue **[20]** with 1,573 citations, Tongzon and Heng **[21]** with 815 citations, Slack **[22]** with 556 citations, Tongzon **[23]** with 525 citations, and Lirn *et al.* **[24]** with 442 citations. Notably, the dataset provides no significant evidence that older publications are cited more frequently, suggesting that citation trends are influenced by factors beyond publication age.

3.1.3 Paper type analysis

Haud dubium, scientific articles remain the most reliable and impactful sources of knowledge, as evidenced by the sample analyzed in this study (**Table 6**). With an average of 160.84 citations per article, research papers demonstrate a substantial contribution to advancing the field. In contrast, book chapters, while present in smaller numbers, exhibit a lower average citation count, suggesting that they are referenced less frequently in academic research. Theses, which have the lowest average citation count, reflect limited dissemination and a more specialized focus. This observation also highlights a scientific gap, as the topic of port attractiveness and related themes appears to be infrequently addressed in

Table 5 Top cited paper according to the *Google Scholar* counting (n=87)

Rank	Author (s)	Year of Publication (Yr)	Number of Citations (Nc)
1	Notteboom and Rodrigue **[20]**	2005	1,573
2	Tongzon and Heng **[21]**	2005	815
3	Slack **[22]**	1985	556
4	Tongzon **[23]**	2009	525
5	Lirn *et al.* **[24]**	2004	442
6	Song and Yeo **[25]**	2004	387
7	Malchow and Kanafani **[26]**	2004	384
8	Yeo *et al.* **[27]**	2008	362
9	Chang *et al.* **[28]**	2008	335
10	Malchow and Kanafani **[29]**	2001	299
11	Lam and Notteboom **[30]**	2014	276
12	Ng **[31]**	2006b	259
13	Wiegmans *et al.* **[32]**	2008	258
14	Tiwari *et al.* **[33]**	2003	256
15	Acciaro *et al.* **[34]**	2014a	254
16	Veldman and Buckmann **[35]**	2003	250
17	37 Papers	1970 ≤ Yr ≤ 2017	249 ≥ Nc ≥ 50
18	34 papers	2008 ≤ Yr ≤ 2022	Cited less than 50 times
Total	**87 Papers**	**1970 ≤ Yr ≤ 2022**	**13,099**

Table 6 Average Citations per Paper Type (n=87)

Paper Type	Number of Papers	Total Citations per Paper Type	Average Citations per Paper Type
Research article	78	12,546	160.84
Book Chapter	3	144	48
Thesis	3	40	13.33
Conference and Working papers	2	189	94.5
Book	1	180	180
Total	**87**	**13,099**	**150.56**

doctoral research. The single book in the dataset shows a high citation count, underscoring its significant impact. However, given its singularity, broader conclusions cannot be drawn regarding the influence of books in this domain.

3.1.4 Top Influential Editors/Publishers

In this study's sample, the *Elsevier Group (Elsevier)* emerges as the most prominent publisher in terms of average citations per paper, achieving an impressive 312 citations per article and a cumulative citation count of 3,433 (**Table 7**). The *Taylor & Francis Group* leads in publication volume, contributing 27 papers with a substantial total of 5,086 citations, translating to a strong average of 188.37 citations per paper. Similarly, the *Georg von Holtzbrinck Publishing Group* demonstrates notable academic influence with 15 published papers, garnering a total of 2,768 citations and an average of 184.53 citations per article.

In summary, the German-based *Elsevier Group* distinguishes itself as the most impactful publisher on a per-paper basis, while the UK-based *Taylor & Francis Group* showcases the highest overall influence, reflected in its superior number of publications and cumulative citations. The forthcoming sections will further analyze the distribution of editors and publishers to provide a comprehensive understanding of their contributions to the field.

Table 7 Top influential Editors (n=63)

Headquarter Group Nationality	Editor (Publisher)		Number of Papers		Total Citations per Editor	Average Citations	
	Group	Sub-Group	Per Sub-Group	Per Group		Per Sub-Group	Per Group
United Kingdom	*Taylor & Francis Group*	*Taylor and Francis*	27		5,086	188.37	
Germany	*Georg von Holtzbrinck Publishing Group*	*Palgrave Macmillan*	15		2,768	184.53	
Germany	*Elsevier Group*	*Elsevier*	11	13	3,433	312	264.23
		Elsevier BV	2		2	1	
Germany	*Springer Nature*	*Springer Netherland*	1	3	90	90	43.33
		Springer Open	1		36	36	
		Springer Verlag	1		4	4	
Switzerland	*Inderscience Publishers*	*Inderscience*	1		7	7	
United Kingdom	*Emerald Group Publishing*	*Emerald*	4		158	39.5	

3.1.5 Editors Distribution

The findings reveal that the United Kingdom and Germany each contribute 31 papers, collectively accounting for approximately 71% of the total sample (**Table 8**). This highlights the critical role of major publishing groups from both countries in advancing global research on port attractiveness and competitiveness. Notably, German publishers, including the *Georg von Holtzbrinck Publishing Group*, *Elsevier Group*, and *Springer Nature*, exhibit greater influence than their UK counterparts, as reflected in their higher average citations per paper.

The analysis demonstrates the significant influence of German publishers, with each paper receiving an average of approximately 204 citations, underscoring their strong impact in the field. In comparison, the United Kingdom, represented by *Taylor & Francis Group* and *Emerald Group* Publishing, contributes 31 papers with a total of 5,244 citations. These findings, summarized in **Table 8**, highlight the comparative influence of major publishing groups in advancing research on port attractiveness and competitiveness.

That said, it is important to highlight a notable observation: the findings presented in Part I reveal that the most studied ports by the authors within the sample of this study are not European but predominantly Asian, followed by ports in the Americas.

3.2 Sample Substance and Insights Analysis (SSIA)

In Part I of this study, content analysis focused on identifying the nine PADs and their associated discussions. This subsection aims to present the attributes linked to each PAD, based on an in-depth review of 87 papers selected through the systematic literature review (SLR) process. Regarding the findings of this detailed SSIA, it is important to note that while the manual identification of each attribute is time-intensive, it remains the most reliable method currently available. This approach is justified by the considerable terminological and semantic complexities encountered during the analysis. Moreover, to the best of our knowledge, existing software tools are unable to achieve the same level of precision and reliability as a manual analysis conducted by both researchers and practitioners with specialized expertise in the port and maritime sector.

As a reminder of the findings from Part I, the nine PADs identified are as follows: Port Connectivity (PCon),

Table 8 Editor distribution (n=87)

Rank	Country	Groups and Editors (Publishers)	Total Papers	Total Citations	Citations per Country
1	United Kingdom	*Taylor & Francis Group, Emerald Group Publishing (Emerald)*	31	5,244	169.16
2	Germany	*Georg von Holtzbrinck Publishing Group (Palgrave Macmillan), Elsevier Group (Elsevier, Elsevier BV), Springer Nature (Springer Netherlands, Springer Open, Springer Verlag)*	31	6,333	204.29

Port Costs (PCos), Port External Environment (PEEnv), Port Governance (PGov), Port Facilities (PFac), Green Port Management (GPMan), Port Policy and Management (PPMan), Port Location (PLoc), and Port Service Quality (PSQua). Among these, researchers have most frequently focused on Port Costs, Port Facilities, Port Service Quality, and Port Connectivity. Since 2003, scientific advancements have significantly accelerated research, particularly in the following areas: (**i**) Port External Environment, with a primary orientation to-

ward the tourism and leisure sectors, including efforts to attract cruise vessels and marina users; (**ii**) Port Policy and Management, through the integration of marketing disciplines and techniques into the port and maritime sectors; (**iii**) Green Port Management that includes environmental sustainability and eco-friendly approaches; and (**iv**) Port Governance, which has evolved through enhancements to regulatory frameworks. **Figure 2** illustrates the progression of academic interest across these areas based on the analyzed sam-
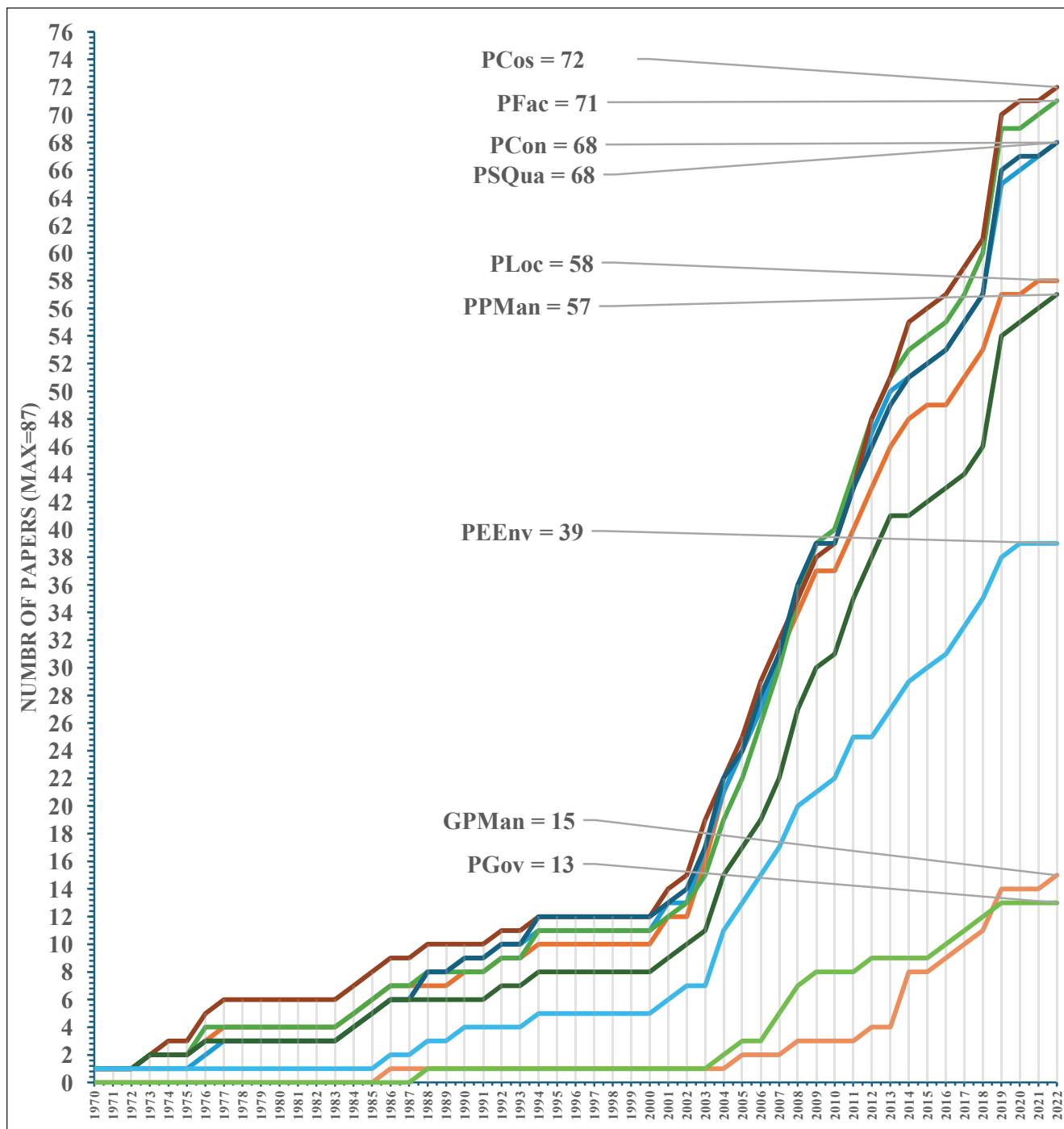
Figure 2 Evolution of Research Interest in Port Attractiveness (1970–2022, n=87)

ple. This figure also serves as a precursor to the presentation of specific items evaluating each determinant, offering insights into the shifting priorities and focus areas in **port strategy development topic**.

Table 9 below provides a detailed list of the items manually extracted for each PAD. Each item has been assigned a specific code to facilitate modeling purposes. It is important to emphasize that the manual extraction process was specifically designed to address the semantic and terminological challenges inherent in the analysis. Through a thorough and in-depth review, our team of expert researchers and practitioners grouped, reclassified, and repositioned certain attributes to ensure greater conceptual clarity and alignment.

Additionally, we have provided detailed explanations for each attribute defining port attractiveness, offering the most comprehensive interpretation available. As a further enhancement, we have incorporated a quantitative parameter: the number of scientific papers that address each of the 116 items. This inclusion provides an additional layer of depth and rigor, highlighting the research focus and relevance of each attribute.

Table 9 The 116 Port Choice Items for Evaluating the Nine Port Attractiveness Determinants

PADs	Items' codes	PADs Measurement	Item Cit./ pap.	References
Port Location (PLoc)	Loc_Mdis	**Maritime distance**, including semantic attributes such as: maritime distance from port origin to final destination, distances between ports, oceanic/diversion distance.	10	[26]; [33]; [36]; [37]; [38]; [29]; [32]; [39]; [40]; [41]; [42]; [31]; [43]; [35]; [24]; [44]; [45]; [46]; [47]; [48]; [49]; [27]; [50]; [51]; [52]; [53]; [54]; [55]; [56]; [57]; [58]; [59]; [20]; [60]; [7]; [61]; [23]; [62]; [63]; [64]; [6]; [21]; [65]; [66]; [67]; [68]; [69]; [70]; [71]; [72]; [22]; [73]; [74]; [28]; [75]; [76]; [77]; [78]
	Loc_Empa	**Ease of maritime port accessibility**, including: convenient entry/exit of ultra large container ships.	21	
	Loc_Ehpa	**Ease of hinterland port accessibility** by land rail, road and barge.	18	
	Loc_Piea	**Proximity to import/export area**, including: proximity to cargo origin or destination, ample cargo sources; inland distance from the cargo origin to the port, proximity to natural resources, proximity to other sources of flows such as airport in the case of transiting passengers and cruise industry.	42	
	Loc_Palc	**Proximity to alternative loading center**, including: free zone FTZ, hub ports or feeder, deep-water port.	12	
	Loc_Pmnr	**Proximity to main navigation routes/trade lane**, including: proximity to popular cruise regions or routes and deviation from main truck routes.	17	
	Loc_Panm	**Proximity to a niche market**.	3	
	Loc_Pdpo	**Proximity to dry ports**, including inland container terminal.	3	
	Loc_Gabs	**Geographical advantage for bunkering service**.	1	
Port Connectivity (PCon)	Con_Cmnr	**Connectivity to main line navigational route**. Also, it could be the number of routes served by ports in the region.	10	[43]; [64]; [35]; [79]; [62]; [60]; [7]; [58]; [24]; [59]; [73]; [28]; [26]; [23]; [63]; [80]; [45]; [81]; [36]; [37]; [38]; [29]; [21]; [77]; [46]; [82]; [47]; [83]; [65]; [68]; [75]; [70]; [20]; [49]; [84]; [27]; [85]; [50]; [71]; [86]; [72]; [51]; [52]; [56]; [22]; [53]; [87]; [54]; [88]; [40]; [41]; [89]; [90]; [33]; [66]; [61]; [48]; [44]; [55]; [91]; [32]; [92]; [25]; [93]; [78]; [67]; [6]; [94]
	Con_Fsmr	**Frequency of scheduled/maritime routes**, including attributes such as : frequency of weekly departures; dense ship network and routes ; frequency of sailing ; number of sailing.	18	
	Con_Cadp	**Connectivity to a dry port** whatever the distance. Branch [53] used the expression '*Inland Clearance Depot (ICD)*' to describe what will be also known as '*dry port*' or '*bonded warehouses.*'	2	
	Con_Siea	**Service coverage of the major import/export areas** of the country, including port service coverage.	6	
	Con_Nscp	**Number of services calling at port**, including level of concentration of liner shipping services at the hub port, diversity in overseas contacts, frequency of ship visits/calls, number of ship visits.	17	
	Con_Flpc	**First port of call or last port of call**, including frequency of sailing as home-port (departures), embarkation port type which is called home-port type in the cruise industry.	6	
	Con_Fshn	**Feeder shipping network**, including frequency of feeder service and number of routes served.	13	
	Con_Iwco	**Inland waterway connectivity** including rivers connections.	7	
	Con_Imml	**Inter and multimodal links** that include access to other transport modes and land connections, e.g.: bridges, rail, routes, pipelines connectivity or the door-to-door carrying.	49	

PADs	Items' codes	PADs Measurement	Item Cit./ pap.	References
Port Facilities (PFac)	Fac_Rmsc	**Resource for moving special cargo/shipments** encompassing the ability to provide specialized equipment and/or service arrangements when required.	11	**[89]; [83]; [7]; [95]; [44]; [48]; [51]; [53]; [87]; [40]; [41]; [80]; [28]; [33]; [59]; [96]; [64]; [45]; [36]; [6]; [77]; [66]; [69]; [70]; [20]; [27]; [32]; [85]; [50]; [54]; [39]; [43]; [24]; [73]; [21]; [65]; [68]; [97]; [82]; [93]; [52]; [25]; [86]; [42]; [38]; [98]; [49]; [78]; [91]; [22]; [31]; [55]; [58]; [99]; [94]; [60]; [5]; [75]; [84]; [72]; [74]; [81]; [23]; [71]; [63]; [46]; [76]; [100]; [47]; [79]; [56]**
	Fac_Mwdd	**Maximum water draft/depth**.	25	
	Fac_Dwac	**Depth of water access/channel depth**.	16	
	Fac_Nbap	**Number of berths at the port**.	17	
	Fac_Bsql	**Berth size/quay length**.	14	
	Fac_Asfa	**Adequacy of storage facilities**, including attributes such as : Sufficiency and secured storage capacities of all type of cargoes (container, bulk cargo, break bulk cargo) warehousing services and distribution;	20	
	Fac_Asse	**Availability of Seaport security and safety equipment**.	10	
	Fac_Itat	**I.T. and advanced technology,** including EDI system and transportation and handling technologies.	29	
	Fac_Posq	**Port superstructure quality** which covers the availability of adequate and advanced facilities for vessels, and the sufficient cargo handling equipment capacity.	36	
	Fac_Ngcr	**Number of gantries** or cranes for container and dry bulk, including appellation such as number of handling equipment for break-bulk and number of operational pipelines.	14	
	Fac_Poiq	**Port infrastructure quality**/availability of adequate and advanced port infrastructure. / It also may be, depending of the definition of researchers, the level of infrastructure that can be correlated to the GDP of counties./ Adequate wharfs and back-line land (For both goods and passengers).	27	
	Fac_Suwa	**Sufficient work area** including appellation such as the terminal and port area, and the port size.	21	
	Fac_Exnc	**Excellent natural conditions**, including stable water surface, stable climate and large area within ports, ice limitation access, disruption due to fog, meteorological records, e.g., high winds, Tidal windows, etc.	12	
	Fac_Achs	Automation of cargo handling system.	1	
	Fac_Epsi	**Existence of port support industries** : this attribute encompasses companies providing service like finance and insurance entities, feeders, warehousing companies and the range of warehousing services provided by the port (e.g., cross-docking, consolidation and palletization, packing, kitting, labelling, stuffing and de-stuffing, inventory management, continuous replenishment, Added value services for fret, differentiation services, dry-bulk services for trucks (e.g., weighting), Services to break-bulk cargoes, e.g., weighting, added value services, etc.	10	
	Fac_Pbfc	**Port bunker fuel capacity**.	1	
	Fac_Abse	**Availability of bunkering services**.	3	
	Fac_Arss	**Availability of repairs and shipyard services**.	1	
	Fac_Asic	**Availability of shipbuilding industry** and the shipbuilding capability of the maritime cluster.	1	
	Fac_Ashs	**Availability of shipbroking services**.	1	
	Fac_Ibsf	**Ice-breakers services/Facilities**.	1	
	Fac_Cchm	**Capacity of cargo handling machines**.	3	
	Fac_Dtft	**Dedicated terminals and facilities for transhipment**.	4	
	Fac_247o	**24/7 operations**, also : 24h a day/seven days a week service.	6	
	Fac_Epss	**Existence of a port-associated business in a single office structure,** e.g.: the port community building at Anvers Port.	1	
	Fac_Saft	**Size and activity of Free Trade Zone** (FTZ) in port hinterland.	5	

PADs	Items' codes	PADs Measurement	Item Cit./ pap.	References
Port Costs (PCos)	Cos_Cthc	**Container/Cargo handling fees and Terminal Handling Charges (THC),** including all types of cargoes, Stevedoring costs, Charges for use of equipment.	40	[89]; [80]; [28]; [24]; [32]; [59]; [66]; [95]; [33]; [58]; [35]; [31]; [23]; [96]; [42]; [63]; [44]; [45]; [81]; [101]; [5]; [6]; [38]; [98]; [21]; [82]; [65]; [69]; [70]; [86]; [93]; [85]; [51]; [52]; [54]; [39]; [94]; [60]; [88]; [41]; [55]; [73]; [90]; [7]; [59]; [26]; [64]; [37]; [29]; [47]; [48];[27]; [50]; [71]; [72]; [76]; [22]; [87]; [40]; [79]; [43]; [46]; [61]; [74]; [36]; [20]; [78]; [53]; [91]; [102]; [30]; [34]
	Cos_Ltco	**Low transhipment cost**. It encompasses also the cost of feeder link between Hub and feeder ports.	4	
	Cos_Stfe	**Storage fees** (including all types of cargoes).	8	
	Cos_Pocf	**Port charges and fees** (for both vessels and goods), including other semantic designation and other conservancy dues such as port tariff and harbour dues, port navigation fees, port berthage, berth hire, wharfage and demurrage, Dockage, port information costs, transport information cost.	49	
	Cos_Gtdu	**Government tax and duties** (including Customs costs).	10	
	Cos_logi	**Logistics costs** that include delivered prices, freight rates, travel/transportation cost, sea transportation cost, inland transportation cost, import/export tariff, rail-rate cost, road trucks rate cost, costs related to quality of onshore infrastructure, inland transportation cost, packing charges.	34	
	Cos_Pilc	**Pilotage cost.**	10	
	Cos_Towc	**Towage cost.**	9	
	Cos_Ewgd	**Electricity, water and garbage disposal cost.**	2	
	Cos_Offp	**Offering a free port**, a free zone of duties and taxes or a free trade zone.	6	
	Cos_Ovet	**Overtime dues** and travelling expenses outside normal hours.	2	
	Cost_Prom	**Promotional dues**, including privileged terms to ocean carriers, discounts for long term-clients, free dwell time on the terminal, reduction of port dues based on environmental performance.	7	
	Cos_Swco	**Ship's waiting cost.**	2	
	Cos_Engp	**Environmental and Green port dues,** including what Lam and Notteboom **[30]** called: *'fines on marine oil spill related to shipping traffic', 'fines for non-compliance with agreements on modal shift cost for intermodal connection', 'fines on pollution damage to the marine environment by dumping of wastes for industrial activities',* and *'environmental-based pricing in cargo handling and storage'.*	3	
	Cos_Bpco	**Bunkering price/cost**.	3	

PADs	Items' codes	PADs Measurement	Item Cit./ pap.	References
Port Service Quality (PSQual)	Psq_Rbsh	**Reliability of the berth schedule**, Also known as berth time.	5	**[89]; [6]; [48]; [69]; [40]; [28]; [51]; [91]; [88]; [83]; [33]; [45]; [65]; [67]; [93]; [60]; [80]; [79]; [46]; [82]; [26]; [23]; [38]; [21]; [100]; [66]; [85]; [42]; [31]; [44]; [98]; [72]; [52]; [87]; [39]; [64]; [90]; [7]; [24]; [74]; [59]; [41]; [43]; [58]; [63]; [36]; [32]; [53]; [94]; [55]; [73]; [35]; [81]; [68]; [70]; [76]; [25]; [86]; [84]; [27]; [50]; [71]; [78]; [95]; [77]; [22]; [54]; [75]**
	Psq_Sefs	**Slot exchange facility** with cooperating shipping lines.	6	
	Psq_Ahlv	**Ability to handle large volume shipments and a great amount of people at one time.** Also known as the percentage of cargo off-loaded/loaded and the amount of cruisers handled at one time.	9	
	Psq_Rchs	**Reliability of cargoes or the container handling services.**	5	
	Psq_Scha	**Speedy cargo handling**, which means the average of the off-loading/loading time, including time needed to transfer the shipment from the ground to the vessel.	12	
	Psq_Prel	**Port reliability** which concerns the minimum cases of delays, the no-errors at port operations, the consistency of the performance or the frequency of delays in loading/unloading.	14	
	Psq_Tief	**Time efficiency.**	5	
	Psq_Trti	**Transit time.**	13	
	Psq_Vsti	**Vessel turnaround time.**	20	
	Psq_Ewop	**Efficient wharf operations**, including efficiency on container pickup/delivery process, efficiency of (un)loading of dry bulk, break-bulk and liquid bulk.	19	
	Psq_Inqu	**Information quality** that includes the effectiveness and efficiency of information systems/Community systems and information accessibility such as complete timely and correct cargo information, sharing information, information availability like statistical data of the delivery performed.	21	
	Psq_Achv	**Assistance in claim handling and claim vessels,** including items expressed in other words such the settlement of accident claims in port.	9	
	Psq_Cdti	**Cargo dwelling time.**	4	
	Psq_Ense	**Efficiency of navigational services** such as pilotage, towage and mooring, and quality of other harbour operations.	5	
	Psq_Sire	**Speed in responding,** also known as 'prompt response', to liner's new demands and requests, including readiness to provide service by employees, quick response to demands of customers/port users;	22	
	Psq_Ruor	**Reflection of container port users opinions and requirements** including semantics such courtesy of carrier employee, settlement of special requirements, attitude of customer-oriented port.	9	
	Psq_Uucn	**Understanding the user's/customers' needs.**	7	
	Psq_Ephs	**Efficiency of port husbandry services** like ship repairs, bunkering services including the waiting time for bunkering.	5	
	Psq_Beav	**Berth availability, including o**pportunities for on-arrival berths, berthing windows and berth occupancy.	6	
	Psq_Sdti	**Shortned demurrage time.**	2	
	Psq_Pqce	**Port quality certificates**, e.g., ISO norms and ISPS code.	1	
	Psq_Qepm	**Quality-efficiency of port-maritime related-services** such: inland waterway services, rail and road transport services, quick and safe access to port facilities from an inland transport system (rail, truck, barge, pipeline).	5	
	Psq_Uexp	**Users' experience.**	2	

PADs	Items' codes	PADs Measurement	Item Cit./ pap.	References
Port Policy and Management (PPMan)	Ppm_Cuma	This attribute is related to **customs management** that includes some appellations such as custom clearance procedure, custom regulation, custom efficiency, and simplicity in customs administration.	28	[89]; [31]; [28]; [58]; [24]; [73]; [96]; [42]; [44]; [55]; [64]; [79]; [36]; [98]; [100]; [66]; [69]; [32]; [72]; [78]; [52]; [53]; [87]; [54]; [39]; [60]; [88]; [40]; [74]; [75]; [84]; [43]; [77]; [7]; [95]; [6]; [23]; [82]; [65]; [48]; [51]; [91]; [41]; [93]; [80]; [46]; [85]; [50]; [94]; [27]; [38]; [57]; [70]; [20]; [56]; [63]; [22].
	Ppm_Sfps	**Support from the port staffs.**	1	
	Ppm_Pmpa	This attribute is related to **port management exercised by port authority** including port administration policies, regulations, and strategies, e.g., flag discrimination.	16	
	Ppm_Ptre	**Port/terminal reputation** which is based on the port cargo damage, delivery tie, carrier reputation, cargo safety, and Port positive goodwill/brand.	29	
	Ppm_Eapr	**Efficiency of administrative procedure.**	1	
	Ppm_Pwsr	**Port workers safety rules.**	4	
	Ppm_Pwfl	**Port workers foreign language skills,** e.g., communication with staff.	2	
	Ppm_Rdsi	**Regular dialogues and social interactions** between the port's public relations staff and port users.	5	
	Ppm_Plpe	**Port labourers' performance.** This attribute evaluate satisfaction on people's performance including personal competence and knowledge, level of education, even if some authors (e.g., Kim [51]) do not consider this attribute important in the selection of port.	14	
	Ppm_Aspp	**Availability of staff and professional personnel** in port, including the item : "*Immediate customer's objection acceptance*".	8	
	Ppm_Pmin	**Promotion and Marketing initiatives**/efforts by the port management actors (i.e., port authority and/or operators) including items such effective port pricing, incentives, promotional activity of carrier, and competing carriers.	18	
	Ppm_Whco	**Working hours' congestion.** Also: port congestion and traffic congestion).	16	
	Ppm_Swti	**Ship's waiting time.**	12	
Green port management (GPMan)	Gpm_Gppr	**Environmental sustainability of the economic activities linked to the port that include green port projects such as** protecting water quality and animals, reducing harmful air emissions, carbon neutrality/carbon footprint, and others environmental solutions-alternatives initiatives.	14	[89]; [55]; [64]; [99]; [102]; [20]; [84]; [30]; [34]; [103]; [52]; [53]; [87]; [39]; [76]
	Gpm_Rpeg	**Reward or punishment** of port operators over/under performing against specific environmental goals.	5	
	Gpm_Ware	**Waste reception** facilities within the port.	2	
	Gpm_Ciga	**Communication of information on green activities of the port,** e.g., environmental report.	4	
	Gpm_Iems	**Implementation of 'Environmental Management System'** (EMS).	2	
	Gpm_Ispe	**Implementation of system for the production of energy from renewable resources**;	2	
	Gpm_Iner	**Implementation of national/regional/global environmental regulation.**	7	

PADs	Items' codes	PADs Measurement	Item Cit./ pap.	References
Port External Environment (PEEnv)	Exe_Pple	**Local/Regional political policies and legal environment**, including Government policies and political stability.	11	**[55]; [96]; [46]; [66]; [75]; [69]; [70]; [49]; [87]; [91]; [41]; [98]; [32]; [72]; [90]; [24]; [21]; [84];[27]; [50]; [51]; [53]; [54]; [88]; [40]; [34]; [59]; [63]; [99]; [45]; [36]; [38]; [67]; [68]; [25]; [86]; [85]; [71]; [52]**
	Exe_Ssms	**Sound security management system**. This attribute is related to the operational safety, including : anti-terrorism and security systems, international conventions on safety, crime organized, port meeting IMO security standards.	5	
	Exe_Sssw	**Stable social situation** and sound working environment such as labour problems and issues of strikes.	15	
	Exe_Igep	**Implementation of green energy policy** at the territory where the port is located.	2	
	Exe_Imsi	**Importance of the market size** (for both Goods and Passengers). Researchers used also indicators such as port cargo Volume (Port Throughputs) or others external economical items like the regional economy growth, the importance of the local population and the demand for container shipping.	24	
	Exe_Apec	**Ability to provide pleasing environment for cruise vessels**, including the access to an area possessing either a landmark of historical importance, the exotic or foreign culture and the good climate.	2	
	Exe_Seco	**State of the external competition**. The external competition includes the state of competition from other seaports, dry ports, bonded warehouses or external free trade zones.	1	
Port Governance (PGov)	Gov_Trus	**Level of trust between firms.**	5	**[79]; [57]; [100]; [84]; [46]; [90]; [99]; [49]; [52]; [87]; [47]; [93]; [20]**
	Gov_Lead	**Presence of leader firms.**	4	
	Gov_Sfel	**Spirit of free entreprise looms** large.	1	
	Gov_inco	**Internal competition,** especially between users and operators.	6	
	Gov_Hips	**High involvement from private sector in terminal operations**.	3	
	Gov_Epca	**Existence of mutual agreement/consensus mechanisms** **s**uch as Port community associations to face and solve *"Collective Action Problems (CAPs)"* [57] also known as *Collective action regime* **[52]**.	4	
	Gov_Cool	The **Cooperation/Collaboration's level** of the institutions and companies involved in the port activity.	2	

4 Discussion

4.1 About Metrics

At first glance, it is evident that the sample metrics underlying the results were collected in August 2022. Consequently, certain indicators, such as citation counts, have evolved for the majority of the analyzed papers. This observation also applies to the H-index of *Scopus*-indexed journals, which typically changes annually as updated by the *Scimago Journal Rank*[2] platform. Notably, the H-index may either increase or decrease over time; moreover, journals can be delisted from *Scopus* entirely, resulting in the annulment of their scoring.

Two examples of indicators subject to temporal variation are particularly noteworthy:

- All the papers in the sample are associated with the citation count metric, which relies on data from the *Google Scholar*[3] search engine.
- Only papers published in *Scopus*-indexed journals are eligible for H-index analysis of their respective publication venues.

At the time of editing this manuscript in 2024, all *Scopus*-indexed journals in the sample had experienced an increase in their H-index scores; no journals had regressed or been removed from the platform's scientific reputation metrics. However, this observation does not apply to the 12 papers in the sample that were not published in journals indexed by the editor *Elsevier*. Conversely, the citation count tracked via *Google Scholar* adheres to different counting rules. It is virtually impossible for an article to regress in citation count, although

stagnation may occur between the time of data collection and subsequent updates at the time of reading.

In this sense, it is essential to consider the insights provided by bibliometric studies. Donthu *et al.* **[104]** and Paul *et al.* **[11]** emphasize that bibliometric analyses are valuable for identifying key authors and trends. However, Paul and Criado **[105]** caution against an overemphasis on quantitative metrics, which may overlook theoretical and methodological depth. This underscores the importance of achieving a balanced approach between bibliometric and content analysis.

4.2 Automated and manual analytical processes

The objective of this study is to identify the port choice items used to evaluate PADs. Initial findings, presented in Part I, included a content analysis conducted using automated methods, specifically *VOSviewer* software, to analyze the titles and abstracts of 87 papers. Additionally, Part I involved a manual analysis of the papers, leading to the identification and discussion of the nine PADs in the *Discussion* section.

In contrast, the present paper—Part II of the study, provides a detailed exposition of the specific items associated with these PADs, employing a manual exploration approach to achieve a deeper and more precise analysis. The distinction between manual and automated methods is particularly significant, as these approaches produce markedly different outcomes. In fact, this study faced the issue of terminological variance, where a single concept may be represented by multiple terms with identical semantic meanings, as explored recently by Dževerdanović Pejović **[106]**. To ensure comprehensive analysis and avoid redundancies, a meticulous manual exploration was adopted, facilitating a holistic understanding of the attributes.

Automated tools such as *VOSviewer* are effective in identifying co-citation clusters, tracing the evolution of research areas, and employing keyword co-occurrence analysis to uncover relationships among topics and concepts. While these techniques are invaluable for identifying broad trends in extensive datasets, automated methods primarily analyze concepts at the level of documents, authors, or publications **[107]**. This may overlook nuanced interpretations that a concept-centric, manual analysis can reveal. *In fine*, extracting attributes through in-depth reading and exploration of each reference within the studied corpus is scientifically the most robust approach.

4.3 Introducing the Port Attractiveness and Customer Satisfaction model (PACS model)

Generally, several theoretical frameworks can be borrowed to study themes related to customer satisfaction and port attractiveness:

(i) For port attractiveness, these include Porter's *Diamond Theory* **[108, 109]**, which examines competitive advantage, and Hales *et al.*'s *Balanced Theory of Port Competitiveness* **[45]**, which specifically addresses port dynamics. Freeman's *Stakeholder Theory* **[110]** further highlights the significance of stakeholder relationships. These foundational works provide critical insights for analyzing attractiveness and competitiveness in port and territorial contexts.

(ii) Concerning Satisfaction's theoretical frameworks, theories, such as *Game Theory* and *Customer Satisfaction* Theories **[111–114]**, offer, in this sense, valuable perspectives. Although Fishbein and Ajzen's *Theory of Reasoned Action* **[115]** is less frequently applied, it remains relevant for understanding decision-making processes. Researchers typically adapt the evaluation of port attractiveness and competitiveness to the empirical context under study, emphasizing the need for flexible and context-sensitive approaches.

In the context of this study, port attractiveness reflects the extent to which a port's features appeal to both existing and prospective stakeholders. Its evaluation involves assessing the port's characteristics from the stakeholders' perspective. A comprehensive list of attributes has been identified as factors that can positively or negatively influence port attractiveness. Stakeholder satisfaction is a crucial aspect of this assessment, given its impact on the attractiveness of a port and the surrounding territory. Despite its strategic importance in port development strategies, the concept of port attractiveness often receives insufficient attention in the literature, representing a significant research gap. Consequently, measuring, evaluating, and enhancing port attractiveness must be intrinsically linked to stakeholder satisfaction across 116 identified attributes.

Pertaining to customer satisfaction, it reflects the evaluation of performance and the suitability of services or products. In the same vein, satisfaction is defined as a post-experience assessment, measured by two primary factors: (**i**) the intention to return and reuse port services, referred to as "*repurchase intention*" **[116, 117]**, and (**ii**) the intention to recommend the port, known as "*positive referral intention*" **[118, 117]**. These intentions serve as critical indicators of overall satisfaction, further linked to the quality of port services.

Hoc sensu, Cho *et al.* **[117]** link customer satisfaction in ports to service quality, which they conceptualize through three dimensions: Endogenous Quality, Exogenous Quality, and Relational Quality. The findings of the present study reveal that the attributes used within these three dimensions by Cho *et al.* **[117]** are partially captured among the 116 attributes identified in this research, which adopts a port choice approach. However, not all the items within these dimensions are fully encompassed under the determinant of port attractiveness referred to as Port Service Quality.
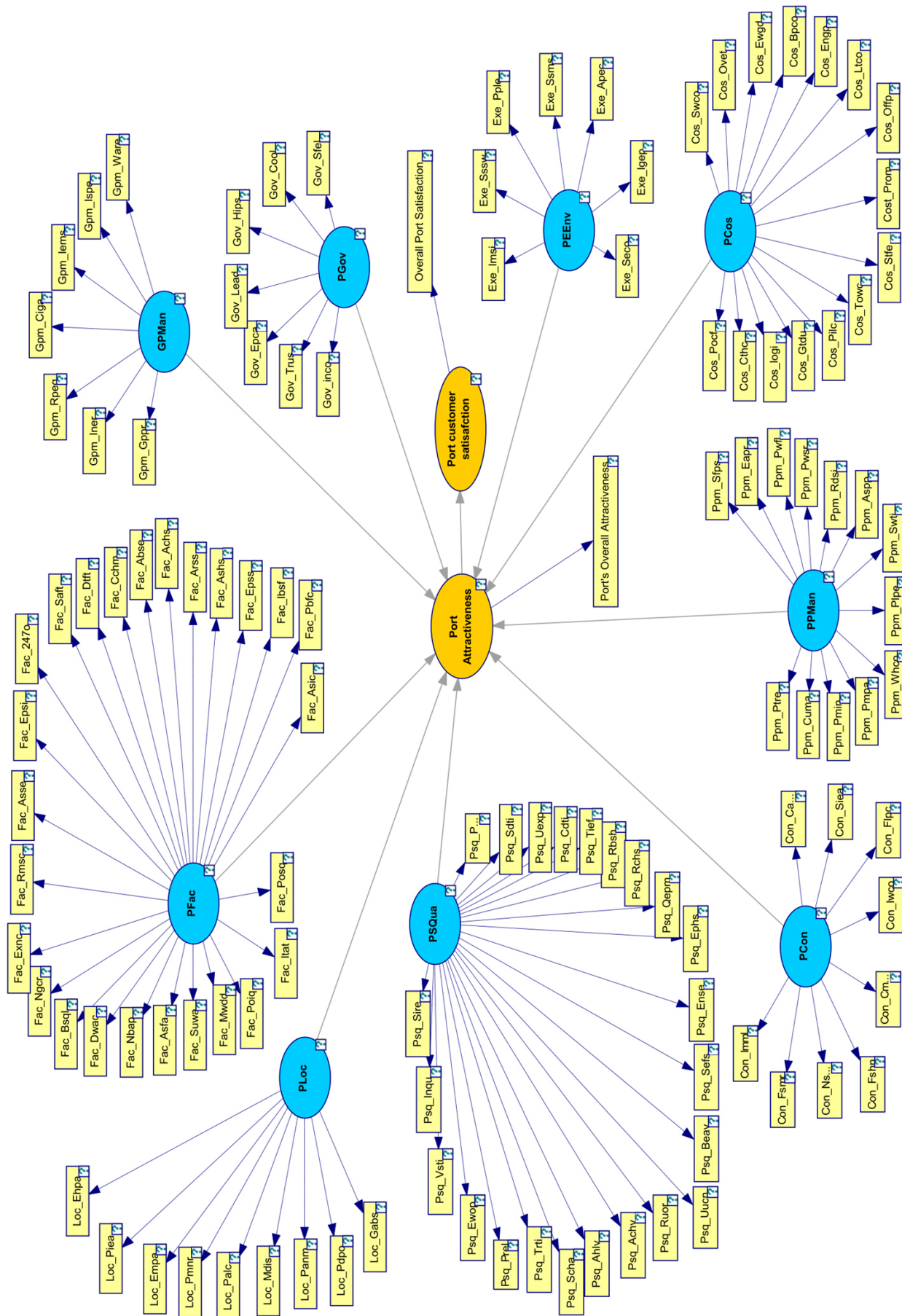
Figure 3 Port Attractiveness and Customer Satisfaction (PACS) Model/Tool

For instance, Cho *et al.* **[117]** identify geographical location and distance from freight sources as variables influencing the Exogenous Quality dimension. In this study, Port Location is measured by attributes such as distance or proximity. While proximity to the hinterland and foreland enhances port attractiveness, proximity does not inherently imply connectivity. Connectivity, which facilitates integration through rail and sea, is highlighted as a strategically significant factor in port evaluation. Similarly, berthing capacity and unloading fees, classified by Cho *et al.* **[117]** as criteria for measuring Endogenous Quality, are reinterpreted in this study. Berthing capacity is assessed under Port Facilities, while unloading fees are classified under Port Costs. Additionally, factors categorized by Cho *et al.* **[117]** under Relational Quality, such as digital infrastructure (e.g., port community systems) and the professionalism of port staff, are reclassified in this research. Digital infrastructure is grouped under Port Facilities, whereas staff professionalism is incorporated into Port Policy and Management.

To conclude this discussion on customer satisfaction, the criteria proposed by Cho *et al.* **[117]** for evaluating port service quality exhibit significant alignment with the determinants of port attractiveness identified in the present systematic literature review. However, it is crucial to differentiate between the two concepts: port attractiveness extends beyond service quality to encompass a wider array of dimensions. Despite this distinction, a link between port customer satisfaction and port attractiveness can be postulated, as illustrated in **Figure 3**.

4.4 Limitations and recommendations for Future Research Agenda

4.4.1 Limitations

As highlighted in Part I, the selection of databases for the literature review represents a significant limitation. While *Scopus* offers a balanced approach between the extensive coverage of *Google Scholar* and the selective focus of *Web of Science*, it does not adequately include certain regional databases, particularly those from Asia and Africa. This is particularly relevant given that, despite Asian ports being among the most studied globally, much of this research is published in prestigious European journals, thereby limiting access to region-specific studies.

In this study, this limitation is further compounded by the predominant focus on English-language publications, with only one paper included in French. In the context of the port and maritime sectors, this poses a critical challenge, especially as regions such as China have experienced exponential growth. The exclusion of databases like CNKI—*China National Knowledge Infrastructure*— and other Mandarin-language references lead to the omission of key contributions, ultimately

hindering a comprehensive and globally inclusive understanding of the port's attractiveness and competitiveness rapid dynamic.

Moreover, the PACS Model, despite its theoretical rigor and practical adaptability, has been primarily oriented to port-specific environments. This narrow focus limits its empirical validation and the exploration of its broader applicability in other complex territorial contexts. Expanding its testing to diverse environments is necessary to fully establish its relevance and utility.

4.4.2 Recommendations for Future Research Agenda

The limitations identified in this study highlight the need for targeted recommendations to guide future research efforts. Addressing these gaps will not only enhance the comprehensiveness and global relevance of studies in the port and maritime sectors but also expand the theoretical and practical utility of the **PACS Model**. The following recommendations outline key areas for further investigation and development:

(i) Integration of Regional Databases: Future research should prioritize the inclusion of regional databases, particularly Asian platforms such as CNKI. Incorporating these sources will enable access to critical works published in Mandarin and help mitigate the current regional imbalance in data representation. This approach will contribute to a more globally inclusive understanding of the port and maritime sectors, particularly in regions experiencing exponential growth, such as Asia.

(ii) Contextual Application of the PACS Model: Expanding the application of the PACS Model beyond port context is essential for validating its adaptability and extending its theoretical and practical relevance. Potential applications include airports, train stations, metro and tram networks, bus terminals, municipalities, regions, and nations. Testing the model in these diverse contexts will establish its broader applicability across complex territorial and infrastructural systems.

(iii) Scientific and Managerial Implications: Future studies should focus on exploring the scientific and managerial implications of the PACS Model when applied to new contexts. For example, using the model to assess territorial attractiveness and competitiveness in urban transportation hubs or regional governance structures could yield insights that are both academically significant and practically actionable for policy-makers and industry stakeholders.

(iv) Comparative Cross-Sectoral Analysis: Conducting comparative studies of the PACS Model across different types of territorial entities can uncover unique determinants of attractiveness and competitiveness. Such cross-sectoral analyses will contribute to refining the model's theoretical framework and enhancing its utility in diverse global contexts.

By implementing these recommendations, future research can address existing limitations and further strengthen the PACS Model's robustness and versatility. Broadening the scope of database inclusion and expanding the contexts in which the model is applied will ensure a more comprehensive and globally relevant understanding of territorial dynamics. This, in turn, will support the advancement of both academic research and practical applications in the field.

5 Conclusion

Building upon a scientific gap in the literature regarding the criteria for selecting a port, this gap lies in the absence of a holistic conceptual framework for evaluating the determinants of port attractiveness. Indeed, each study employs different criteria to measure port choice. This diversity is natural since a port, as a territory, is inherently unique. Therefore, this study, in its two parts (Part I and Part II), sought to restructure the dimensions of port attractiveness—termed the 9 PADs— and to associate them with their corresponding 116 items. This was achieved through a systematic literature review process, followed by bibliometric and content analysis, using automated tools and manual examination of 87 papers published between 1970 and 2022. The resulting holistic conceptual framework was further strengthened by linking it to port customer satisfaction, thereby introducing the Port Attractiveness and Customer Satisfaction (PACS) model, which is designed with flexible and adaptable components, allowing it to be applied in a range of complex territorial contexts.

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