



What is a maritime cluster?

David Doloreux^{a,b}

^a HEC Montréal, Department of International Business, Montréal, (Québec), Canada

^b KEDGE Business School, Talence, France



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ABSTRACT

The phenomenon of maritime clusters has spawned a rich body of scholarly work in the last fifteen years. Yet, the answer to one important question has remained elusive: what is a maritime cluster? This question is important because maritime clusters have rapidly become the focus of economic competitiveness policies promoted by both firms and policymakers. This study reviews research articles published over a 15-year period that investigate maritime clusters and derives three distinct definitions of a maritime cluster from them: an industrial complex, an agglomeration of interlinked industries, and a community-based network.

1. Introduction

In the past fifteen years, the literature on maritime clusters has expanded rapidly. Sustained academic scrutiny of the phenomenon of maritime clusters is not surprising, since they have gained popularity as a key strategic tool through which to support economic development and as a business strategy. Indeed, many governments acknowledge the important role maritime clusters play in not only promoting economic development, but also supporting potential innovation and technological development. As a consequence, maritime cluster policy initiatives and programmes have multiplied in a wide variety of contexts.

Scholars contributing to this research have focused primarily on describing the actors and institutions relevant to maritime clusters, analysing the potential benefits of clustering for maritime industrial activities and innovation, and investigating policies practices related to maritime clusters (see, for instance [7,23,28]). Nonetheless, the answer to a basic question remains unclear: what is a maritime cluster?

This question requires an answer, since maritime clusters are widely used by governments as a strategic tool to promote maritime industries. A clear definition of the term will lead to both a better theoretical understanding of maritime clusters and new possible applications of the term in public policy debates.

This article makes the following contributions. First, it reviews the literature in the field of maritime clusters. The assessment and synthesis should make this field of research more accessible to academicians, contributing to its diffusion among the scientific community and policymakers. Second, it provides a detailed assessment of the state of research on the subject. This information will be relevant to not only scholars, but also policymakers and practitioners who are responsible for developing and implementing maritime cluster policies. Third, the

paper derives three different definitions of a maritime cluster from the literature: an industrial complex, an agglomeration of interlinked industries, and a community-based network.

2. Methodology

To develop a comprehensive review of the research on maritime clusters over time, a four-stage exploration process was applied. First, a search of Scopus was undertaken to identify all scholarly articles pertaining to maritime clusters published in refereed journals. At this stage, to make sure that as much of the relevant research as possible was found, we included research on, inter alia, actors and institutions, innovation and networks, economic performance, national policies, and regional economic development. Second, a systematic search of all articles published in two renowned journals in the maritime field – *Marine Policy* and *Maritime Policy & Management* – was undertaken. Third, articles that were not devoted to maritime clusters were deleted from the list. This left a total of 25 studies, covering a period of about 15 years (see Appendix A). Fourth, each article was scrutinised in an attempt to answer the initial question: what is a maritime cluster?

3. Defining maritime clusters: different perspectives

As explained by Pinto et al. [23: 168], ‘the cluster concept takes on different meanings depending on the sectors in which it is being examined and varies according to a spectrum that can range from geographical perspectives to socio-cultural factors or even territorial dimensions’. In this section, three conceptually different definitions of a maritime cluster are distinguished: an industrial complex, an agglomeration of interlinked industries, and a community-based network. The

E-mail address: david.doloreux@hec.ca.

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Table 1
Overview of how the three perspectives define a maritime cluster.

	Maritime cluster as an industrial complex	Maritime cluster as an agglomeration of interlinked industries	Maritime cluster as a community-based network
Description	Maritime clusters are defined on the basis of interindustry transactions as illustrated by input-output models and include a mix of maritime (and other) industries connected by important flows of goods and services.	Maritime clusters are defined on the basis of an agglomeration of industries linked to each other in terms of knowledge, skills, inputs, demand, and/or other factors.	Maritime clusters are defined on the basis of the geographical concentration of maritime industries within a regional community and the presence of a network of firms and institutions that support the development of the industry.
Selected definitions	‘A set of maritime activities which have direct (canal), indirect (bunkering and shipping agencies, shipping, ship chandlers, ship repair and maintenance, launch and pilotage services, dredging), induced (free trade zone, tourism, ports, container repair) and parallel (banking and insurance) effects on the maritime economy’ [21: 170]. ‘An organisation that capture more than one maritime sector... and that represent almost every traditional maritime sectors’, including ‘traditional maritime sectors (shipping, naval construction, naval equipment, maritime services, maritime ports, recreational sailing, offshore, Navy, inland shipping, naval repairs), tourism and coastal recreational activities, fishing (fish manufacturing and aquaculture)’ [26: 54].	A set of ‘activities strongly related to building and operating ships, such as port services, maritime services and ship suppliers’ [14: 213]. ‘Shipyards, ship equipment manufacturers, and ship consultants, and a plethora of other companies and institutions with maritime oriented activities’ [2: 203].	A maritime cluster is a ‘concentration of firms in a particular domain (maritime sectors), research and education organisations which are active in a related field and the presence of public support mechanisms operated by the government and regional stakeholders, through which actors share a common vision of growth and innovation strategies’ [6: 522]. A maritime cluster is a ‘network of firm, research, development and innovation units and training organisations, sometimes supported by national or local authorities, which cooperate with the aim of technology innovation and of increasing the maritime industry’s performance’ [4: 489].
Core concept	Interindustry transactions between maritime and related industries	Innovation and competitiveness of maritime firms	Cluster structure, organisations, and localised dynamics of knowledge exchanges
Key characteristics	Sectoral dynamics (national)	Firm-level innovation and competitiveness (national)	Maritime cluster result from processes unfolding at the local and regional level (regional)
Core references	Morrissey and Cummins [18], Pagano et al. [21], Salvador [25], Salvador et al. [26]	Benito et al. [2], Jenssen [10], Laaksonen and Mäkinen [13], Pinto et al. [23], Makkonen et al. [15]	Doloreux et al. [7], Pinto et al. [23], Suris-Regueiro et al. [29], Monteiro et al. [16]

following section will highlight the differences between the three definitions (Table 1).

3.1. Maritime clusters as an industrial complex

A small set of papers defines a maritime cluster as a group of related industries that are linked to each other in terms of technology and production. That is, these papers define a maritime cluster on the basis of input-output models as an industrial complex that comprises a large set of economic activities based around driver industries [12,18,21,25,26].

Morrissey and Cummins [18] examine the Irish Maritime and Energy Resource Cluster (IMERC). This cluster includes ‘a mix of established marine sectors such as offshore exploitation and production of oil and gas and the maritime transportation sector and emerging sectors such as marine renewable energy and sensing technology’ (p. 640). These researchers define IMERC using input-output models to examine intra-cluster linkages and the relatedness of firms in terms of inputs and outputs across four maritime sub-sectors: marine energy; shipping, logistics and transport; maritime safety and security; and yachting products and services. They show that these sectors have weak intra-cluster links but share a high number of related inputs (financial intermediation services, computer services, and other business services) and outputs (wholesale trade and post and communication).

Pagano et al. [21: 170] define a maritime cluster as developing ‘a set of maritime activities that have direct (canal), indirect (bunkering and shipping agencies, shipping, ship chandlers, ship repair and maintenance, launch and pilotage services, dredging), induced (free trade zone, tourism, ports, container repair) and parallel (banking and insurance) effects on the maritime economy’. They develop a set of input-output coefficients to quantify which economic activities and related businesses are linked to the Panama Canal’s cluster. The findings reveal that the Panama Canal and the its ports are the main driver industries around which the maritime cluster develops and grows.

Salvador et al. [26] and Salvador [25] examine the importance and

interconnectedness of sea-related activities to define maritime clusters. In order to analyse the impact of maritime activities on GDP and employment in Portugal, Salvador et al. adopt a broad definition of maritime clusters and introduce the concept of *mega-cluster* to define a maritime cluster as an ‘organisation that captures more than one maritime sector... and that represents almost every traditional maritime sectors’, including ‘traditional maritime sectors (shipping, naval construction, naval equipment, maritime services, maritime ports, recreational sailing, offshore, Navy, inland shipping, naval repairs), tourism and coastal recreational activities, fishing (fish manufacturing and aquaculture)’ (p.54). Much as Pagano et al. [21] find for Panama, these authors show that Portugal’s maritime cluster is strongly connected to ports and shipping functions, while the connections among other maritime sectors are loose.

In this perspective, maritime clusters are defined through inter-industry transactions as illustrated by input-output models and include a mix of maritime (and other) industries connected by important flows of goods and services. This type of definition offers rich details regarding the possible links between industries that are directly associated with the maritime sector and other industries that act as suppliers or markets for them, but it only tells part of the story.

3.2. Maritime clusters as an agglomeration of interlinked industries

Other scholars use Porter’s [24:197] definition of a maritime cluster as ‘a geographic concentration of interconnected companies, specialised suppliers, service providers, firms in related industries, and associated institutions (for example, universities, standards agencies, and trade associations) in particular fields that compete but also co-operate’. Porter’s definition contains two core elements. First, clusters are constituted of interconnected firms complementing each other within a common value chain. Local rivalry, collaboration, specialised factors, and demanding customers produce benefits for the firms in the clusters. Second, clusters are geographically proximate groups of interlinked firms whose spatial proximity creates an economic environment

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