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Port co-opetition: revisited after 20 years

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ABSTRACT

This paper revisits the concept of port co-opetition with the aim to understand how it has evolved over time since the publication 20 years ago. In so doing, the paper does also attempt to project its future research direction by synthesising the same concept applied to a wide range of academic disciplines. The first aim is of retrospective, while the second of prospective—looking for the future by looking back to the past. The study highlights that co-opetition, defined as doing both collaboration and competition at the same time, has seen noticeable changes over the past two decades by chasing the evolving nature of co-opetition within the port industry from actor-centric and activity-centric perspectives. The focus was initially on individual firms and their interactions; however, there has existed a greater emphasis on the broader activities and their processes as defined co-opetitive relationships. This shift reflects the general trend in the global economy where co-opetition has become increasingly relevant for players to successfully navigate ever more complicated market dynamics. Despite significant progress made in the field of port co-opetition, much of the existing literature remains cantered into the actor-centric view, having limitedly explored the other side of the concept. As a way to fill in this less considered perspective, this paper aims to propose a framework in which the port co-opetition *per se* could be more systematically analysed, leading us to gain a valuable insight into the field for the benefits of researchers and practitioners. This line of study will make us to better understand the concept in a context of port industry as a potential instrument of implementable strategies.

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Port co-opetition; dynamic framework; driver-process-outcome framework; actor-centric to activity-centric; strategic management

1. Introduction

The original article, ‘Port Co-opetition in Concept and Practice,’ published in *Maritime Policy and Management* approximately 20 years ago by Song (2003), made a humble effort towards applying the co-opetition framework to the port industry as a way to better explain the then new (strategically as well as operationally) approach taken by the ports in Hong Kong to spread their financial and operational portfolios to their hinterland South China. The concept itself, widely articulated by Brandenburger and Nalebuff (1996), explores the simultaneous pursuit of co-operation and competition among firms as their strategic options; that is, two seemingly contradictory strategies, when effectively balanced, could lead to superior outcomes from various angles. The 2003

article was one of the earliest scholarly works to bring this concept into the context of an industrial sector: the port industry, where the complexity of competition and collaboration are paramount in a local, regional and even global scale.

Over the past two decades since its publication, this work has garnered over 400 citations (448 as of the end of 2024, according to Google Scholar), reflecting its broad impact across multiple academic disciplines and industrial sectors. The citation trends, illustrated in [Figure 1](#), reveal an interesting trajectory. Citations began to appear as early as 2004, just one year after its publication, and remained consistent until 2009. Following this period, there was a noticeable increase in citations, with fluctuations, reaching a peak in 2018. The upward trend continued through to 2023, coinciding with the twentieth anniversary of the paper's publication. This consistency underscores the growing recognition of co-opetition as both a strategic and operational necessity in various industries, including the port sector. As ports have faced increasing pressures from global competition, environmental regulations, and operational complexities, the concept of co-opetition has emerged as a powerful strategic option to enhance competitiveness and achieve greater efficiencies through collaboration among competitors. This line of strategy has allowed ports to navigate the challenges of modern logistics, improve service offerings, and strengthen their positions in the global supply chain.

The rising citation count not only reflects the scholarly recognition of the paper's foundational insights but also highlights their influence on subsequent research and practical applications to (and even beyond) the maritime industry. Scholars and industry practitioners have cited this work to explore a wide range of its related topics, including strategic alliances, resource sharing, co-operative marketing initiatives, and joint infrastructure projects among ports. These citations demonstrate the article's enduring relevance as it continues to inform and inspire research on how ports can balance competition and co-operation to drive innovation, sustainability and growth. Moreover, the impact of the 2003 paper extends beyond the port sector. It has influenced

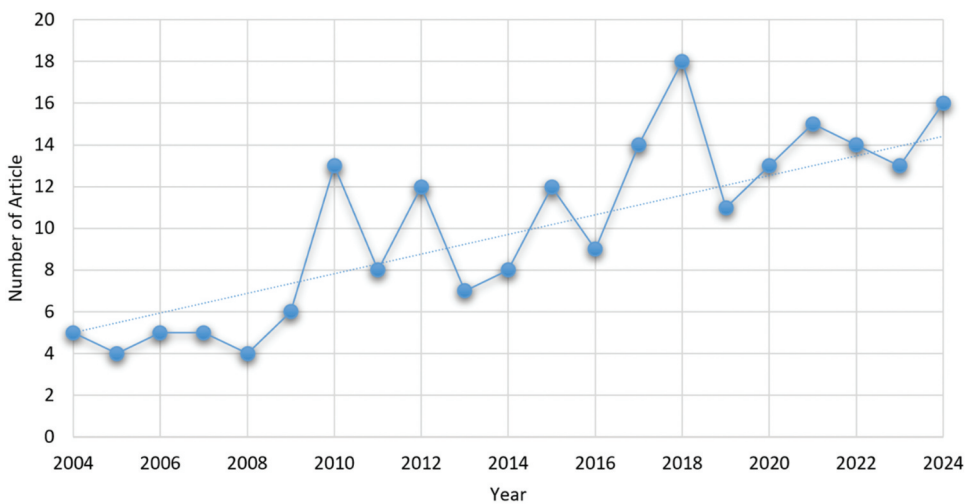


Figure 1. Number of articles citing the 2003 paper. Source: Compiled by the authors

discussions and research in other domains that are similarly grappling with the dynamics of cooperative strategies and competitive pressures. For instance, such industries as aviation, telecommunications, and digital technology have also adopted the co-opetition framework to navigate their unique challenges, demonstrating the versatility and applicability of the concepts introduced in the paper.

Nevertheless, it is important to recognize that the strategic management landscape has evolved significantly over the past two decades. The concept of co-opetition has also undergone substantial development. Scholars have explored various perspectives, expanding the application of co-opetition beyond its original scope and delving into the complexities of implementing and managing such strategies across different industries (Bengtsson and Raza-Ullah 2016; Kostis et al. 2024). Particularly notable is the increased focus on the cognitive abilities required by practitioners to effectively manage the inherent contradictions between competition and collaboration (Yrjölä, Niittymies, and Tabas 2024). These two opposing forces often create paradoxical tensions within organizations, leading to shifts in the state of co-opetition driven by both external and internal factors. As a result, the dynamics of co-opetition are not static but rather constantly evolving, requiring continuous adaptation and strategic realignment.

Given this ongoing evolutionary development, it is timely and imperative to revisit the concept of port co-opetition in order to synthesise its evolution and implications for the future. In light of the advancements-in-progress in the field, the current paper aims two primary objectives: (i) to explore *'what has been made'* in co-opetition concept, with particular reference to the port sector, and (ii) to address *'what is to be done'* moving forward to advance this line of study and its practical applications. To fulfil these objectives, the paper is structured as follows. Following this introduction, [section 2](#) delves into the concept of co-opetition, exploring its dynamic framework, the drivers, processes, and outcomes associated with co-opetition, and its application across various fields. This section also discusses the theoretical underpinnings of co-opetition and how it has been adapted to meet the needs of different industries. [Section 3](#) focuses on the past and present states of co-opetition in the port sector, examining how the concept has been applied historically and the current trends that are shaping its use today. [Section 4](#) looks ahead to the future of port co-opetition, identifying emerging trends, potential challenges, and opportunities for further research and practical application. Finally, [section 5](#) provides concluding remarks, summarising the key insights and implications of the study, and offering recommendations for both scholars and practitioners interested in advancing the practice of co-opetition in the port industry and beyond.

2. Co-opetition in issue and framework

2.1. Conceptual issues

The term 'co-opetition' is defined in a simple manner as a business strategy with which companies, being normally competitors, collaborate with those competitors for a mutual benefit. Historically speaking, strategy and management scholars were exposed in the 1980s to the term coined by Ray Noorda, the Novell founder, to explain the simultaneous pursuit of collaboration and competition by firms. An interest in co-opetition research has been ignited since the publication of the book 'Co-opetition' by Brandenburger and

Nalebuff (1996) and a series of seminal works were followed (e.g. Ketchen, Snow, and Hoover 2004; Luo 2004). Its concept has been widely explored at multiple levels, including dyadic (between two firms), triadic (among three firms), network (among networks of firms), and intra-firm (between departments within a firm) (Bengtsson and Raza-Ullah 2016).

As applications and discussions have been rolled out to different levels and sectors, the term has been also conceptualised in a various way. For example, Brandenburger and Nalebuff (1996) describe it as a value-net phenomenon, while Bengtsson and Kock (2000) as a dyadic relationship between two firms. Daidj and Jung (2011) consider it even as an ecosystem (or a network) where multiple organizations coexist for mutual benefits. Whereas Ritala, Golnam, and Wegmann (2014) view the co-opetition as an effective business model for an expansion of and/or for an entrance into a new market. In contrast, Raza-Ullah, Bengtsson, and Kock (2014) conceptualise it as a paradoxical concept that appears to be a simple construct at the top management level but a challenging task to implement at the middle management in reality. The key reason behind these diverse conceptualisation is the pursuit of two inherently contradictory practices—collaboration and competition—in its nature.

Being aware of this complex and multidimensional nature, together with a wide range of interpretations from an organisation to another, this paper puts forward the two distinct perspectives as a way to streamline the further discussion: that is (i) an *actor* school of thought and (ii) an *activity* school of thought (Bengtsson and Raza-Ullah 2016). The first perspective is concerned with the viewpoint of the actors involved that multiple actors (or an alliance), such as companies, customers, suppliers, competitors, or complementors, come together so as to create a pie larger than otherwise, thereby increasing benefits for all parties through co-operating (with a focus on market growth) and afterwards dividing the pie through competing (with a focus on market shares) (Afuah 2000; Brandenburger and Nalebuff 1996). For example, in the financial services sector, major banks such as JPMorgan Chase, Goldman Sachs, and Citibank, despite being competitors, establish a certain form of collaborations in order to improve operational efficiencies. Yet, at customers end, all these banks compete against each other. This perspective is, however, prone to a specific context or network, thus generalisation becomes onerous.

On the other hand, the second perspective focuses on the co-operative relationship between two organizations rather than within a network. In other words, the co-opetition strategy is considered a dyadic, one-to-one relationship between a pair of organizations. The engaged organizations are not necessarily to co-operate or compete across all the levels; instead, they co-operate on a certain activity(-ies) that is distant from their customers, while competing in an area(s) that is closer to their respective customers (Bengtsson and Kock 2000; Gnyawali and Park 2011; Luo 2007). For example, despite intense rivalry between Apple and Samsung in the smartphone market, the Apple relies upon Samsung for processors and memory chips that are used in its devices. Having partnered with Samsung, the Apple gains an access to advanced display and chip technologies that are critical for its products. Supplying components to Apple generates a stream of revenue significant to Samsung's semiconductor and display divisions (Brandenburger 2020).

Figure 2 illustrates these perspectives at the conceptual level. Over the years, however, market dynamics have continuously evolved, driven by global factors that compel

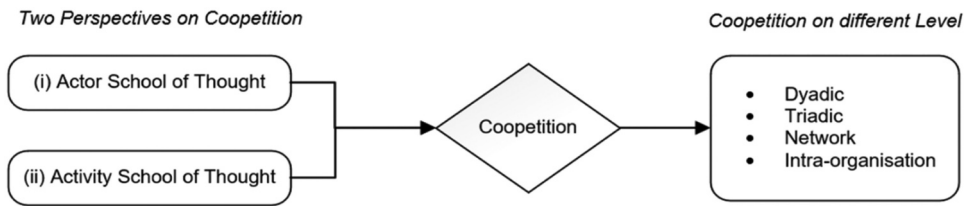


Figure 2. Conceptual issues in co-opetition. Source: Created from Bengtsson and Raza-Ullah (2016)

industries to adapt their strategies. As these market conditions shift, the relationships between and among organizations also undergo significant changes. This evolution directly impacts the nature of co-opetitive relationships, often necessitating a re-evaluation of their strategies to enhance and maintain the competitiveness, aligned with the changing landscape.

2.2. Dynamic framework

Scholars from strategic management generally view co-operation and competition as relational states (Bouncken et al. 2015; Gnyawali and Ryan Charleton 2018) within inter-organizational relationships. A central argument posits that the maximum benefit extractable from a co-opetition relationship can only be realized when co-operation and collaboration are balanced and pursued simultaneously (Kostis et al. 2024). This line of studies emphasises a fundamental challenge of co-opetition: managing the tension between simultaneous and conflicting demands (Bengtsson, Raza-Ullah, and Srivastava 2020; Gnyawali et al. 2016). These tensions encompass issues such as knowledge sharing versus protection, trust versus mistrust, openness versus secrecy, and value creation versus appropriation. The relational perspective underscores the negative consequences that arise when these tensions are mismanaged (Bengtsson, Raza-Ullah, and Srivastava 2020). These include the loss of valuable knowledge, opportunistic behaviour by partners, improper use of shared resources, high dependencies leading to lock-in effect, hindrances to individual differentiation, and potential misuse of jointly acquired knowledge (Hannah and Eisenhardt 2018; Hoffmann et al. 2018). Thus, effectively navigating these tensions is crucial for the success and sustainability of co-opetition relationships (Lado, Boyd, and Hanlon 1997).

This phenomenon has been described as a paradoxical tension between collaborating organisations, highlighting the cognitive difficulties managers face when pursuing multiple and simultaneously contradictory demands (Fernandez and Chiambaretto 2016; Fernandez, Le Roy, and Gnyawali 2014). For managers, co-opetitive situations are inherently dynamic and unstable, often leading to tensions, as demonstrated by Xue et al. (2023), that co-opetition introduces unique tensions (considered as risks) that challenge managers' cognitive abilities. These tensions can arise when managers are faced with scenarios such as a weaker competitor evolving into a strong one or the potential loss of a core technology. Moreover, the competing demands inherent in co-opetition typically evoke defensive reactions from managers. Often, managers may opt to avoid these tensions rather than confront them directly (Lewis 2000). How managers

perceive and manage these tensions and contradictions varies, influencing whether they choose to accept and navigate the tensions or disengage from the co-opetition entirely.

The co-opetition at any level cannot be considered a static phenomenon; it continually shifts from one stage to another due to internal, external or relational drivers. Reflecting this shifting nature, Kostis et al. (2024) proposed a co-opetition dynamic framework between two or more organizations, which can manifest in four distinct phases depending on the intensity of collaboration and competition. As illustrated in Figure 3, the phase (A) indicates strong co-opetition: this scenario features high levels of both collaboration and competition. Organizations engage in intense collaborative efforts while simultaneously competing fiercely in the marketplace. This dynamic requires sophisticated management to handle the inherent tensions and ensure that both collaboration and competition are balanced effectively. Successful balance in strong co-opetition can lead to significant innovation and market leadership, but it also demands a high degree of strategic alignment and trust between the parties involved. Understanding and managing these varying intensities is crucial for organizations to harness the full potential of co-opetition. Managers must navigate the complexities of these relationships, balancing collaboration and competition to maximize benefits and minimize risks.

The phase (B) is usually a competition-dominant co-opetition, here, the level of competition is high, and the level of co-operation is low. Organizations are primarily competitors, striving to outperform each other in the market. However, they still find areas (or activities) where limited co-operation can be beneficial, such as setting industry standards or engaging in non-core collaborations that do not directly threaten their competitive positions. On contrary, the phase (C) indicates collaboration-dominant co-opetition—in this scenario, the level of co-operation is high, while the level of competition is low. Organizations in this type of relationship focus more on collaborative efforts, such as joint ventures, shared research and development, and pooling resources for mutual benefit. The competitive aspect is minimal, allowing both parties to leverage each other's strengths and achieve common goals. The final phase in this framework is

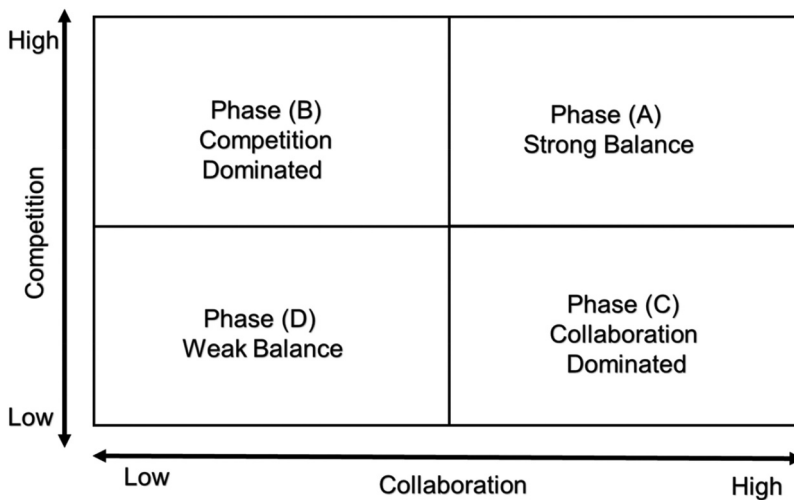


Figure 3. Co-opetition dynamic framework. Source: Modified from Kostis et al. ((2024), 160)

a phase (D) which is indicated as a weak co-opetition—in this phase, both collaboration and competition are present but at lower intensities. The relationship is characterized by moderate levels of collaboration and rivalry. Organizations may engage in joint projects or share certain resources, but the impact on their competitive strategies is relatively minor. The balance is delicate, with neither co-operation nor competition dominating the relationship. In short, the state of co-opetition between two or more organisations cannot be considered a static phenomenon. Depending on internal or external drivers, the state of co-opetition can change or fluctuate from one phase to another. The key question remains: What are the drivers that influence the decision to engage in a co-opetition strategy between two or more organizations, and what outcomes do these organizations achieve by forming such relationships?

2.3. ‘Driver – process – outcome’ framework

Another framework to be used for analysing a varieties of co-opetition scenarios is the ‘Driver-Process-Outcome,’ as depicted in Figure 4.

• **Driver**

A growing number of organizations across various industries and regions are choosing to collaborate with competitors or complementors. This trend can be attributed to several factors, both *external* and *internal*, that drive organizations toward such alliances (Bengtsson and Raza-Ullah 2016). One of the most significant external drivers is the ongoing shift in the global economy. Globalization has fundamentally altered market landscapes, erasing traditional boundaries and creating a more interconnected world. As a result, organizations face increased competition not just locally but on a global scale. This pressure often forces competitors to collaborate, pooling resources and expertise to survive and thrive in an increasingly competitive environment (Dowling et al. 1996). In this context, globalization acts as a disruptive force that motivates organizations to adopt

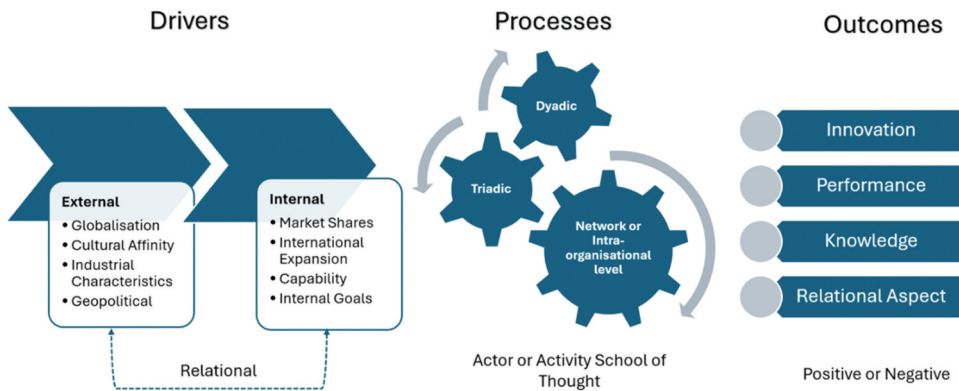


Figure 4. Co-opetition DPO framework. Source: Modified from Bengtsson, Raza-Ullah, and Vanyushyn (2016)

co-opetition strategies, allowing them to share risks, reduce costs, and access new markets more effectively (Padula and Dagnino 2007)

Cultural affinity within specific markets also plays a crucial role in fostering co-opetition (Lascaux 2020). When organizations operate in markets with shared cultural, linguistic, or regional characteristics, they may find it advantageous to collaborate rather than compete directly (e.g. co-opetition between Prada and Gucci Luxury Fashion Bands). This collaboration enables them to leverage their collective strengths, differentiate themselves from other global players, and better cater to the unique needs of these markets. By doing so, they can create a more robust market presence and enhance their competitive edge. Furthermore, the characteristics of specific industries and the rapidly evolving technological landscape are powerful external factors that compel organizations to consider co-opetition. In industries characterized by high levels of innovation and technological advancement (Bouncken and Kraus 2013), the pace of change can be overwhelming for any single organization. By cooperating with competitors or complementors, organizations can share the burden of research and development, accelerate the pace of innovation, and stay ahead of industry trends (Sahaym, Steensma, and Schilling 2007). This is particularly relevant in sectors such as technology, pharmaceuticals, and automotive, where the cost and complexity of innovation are exceptionally high.

Internally, organizations are driven to engage in co-opetition by several strategic or tactical considerations. One of the primary motivations is the desire to enhance their market shares (Dowling et al. 1996). By forming alliances with competitors, organizations can strengthen their market presence, access new customer segments, and improve their overall competitiveness. This is especially important in saturated or mature markets where organic growth opportunities are limited. Moreover, international expansion is another key internal driver for co-opetition. For organizations looking to enter new markets, especially in foreign countries, partnering with a local competitor can provide valuable insights into local market dynamics, regulatory requirements, and customer preferences. Such partnerships can facilitate a smoother entry into these markets, reduce the risks associated with international expansion, and accelerate the establishment of a strong market foothold (Khanna, Gulati, and Nohria 1998).

Additionally, organizations may engage in co-opetition to protect their existing market share. In highly competitive industries, collaborating with a competitor can help organizations fend off new entrants, defend against disruptive innovations, or counteract aggressive market strategies from other players. By working together, organizations can maintain their market position and ensure long-term sustainability. Capability enhancement is another significant internal motivator for co-opetition. Organizations may seek to collaborate with others to acquire new skills, technologies, or knowledge that they do not currently possess (Padula and Dagnino 2007). This is particularly relevant in industries where technological advancements are rapid, and staying ahead requires constant innovation. Through co-opetition, organizations can gain access to complementary resources and capabilities, enabling them to innovate more effectively and respond to market changes more swiftly. Finally, co-opetition can also be a strategic response to external vulnerabilities. In an unpredictable and volatile global economy, organizations may face various risks, such as economic downturns, supply chain disruptions, or geopolitical tensions. By forming alliances with competitors or

complementors, organizations can share these risks, enhance their resilience, and protect themselves from potential threats.

- **Process**

While strong internal and external drivers may push organizations toward co-opetition, the actual process of configuring and managing such relationships is inherently complex and challenging. As explored in Section 2.1, numerous paradoxical tensions emerge from the constantly shifting internal and external factors that organizations face, coupled with the ongoing need to strike a delicate balance between competition and collaboration. Moreover, the co-opetition process is not uniform; it varies significantly depending on the level at which it operates—whether at the dyadic, triadic, network, or intra-organizational level. This variability adds layers of complexity to both the Actor and Activity Schools of Thought (Bengtsson and Raza-Ullah 2016).

Within the ‘actor school of thought,’ the dynamic nature of co-opetition is closely linked to the fluctuating interdependencies and interactions among firms within a network. This process is highly fluid, as companies continuously adjust their interactions to adapt to changing circumstances (Pathak, Wu, and Johnston 2014). The network itself is in constant flux, with new actors entering, existing ones exiting, and participants altering their levels of commitment or focus. Some firms might increase their investments, while others may scale back or redirect their efforts, creating a constantly evolving landscape of co-opetition. In today’s fast-paced environment, characterized by industry convergence and rising customer expectations for complex, integrated, and customized products and services, firms must remain agile to stay competitive and meet market demands. Pathak, Wu, and Johnston (2014) explore this ongoing process of configuration and reconfiguration within co-opetition supply networks, noting that the dynamic nature of these networks is shaped by the intricate relationships between firms, firm-level tasks, network-level objectives, and governance structures. The complexity of co-opetition within the Actor School is further illustrated by the multifaceted roles that a single actor often plays within a network. An organization may simultaneously cooperate and compete with various partners, leading to conflicting roles and responsibilities. This complexity is a defining characteristic of networked relationships, where the interdependencies among actors create a complex web of interactions that must be carefully manage (Bengtsson and Kock 2000; Raza-Ullah, Bengtsson, and Kock 2014).

In contrast, within the ‘activity school of thought,’ the complexity arises from the need to manage simultaneous and often contradictory demands. This perspective focuses on the tensions that result from trying to balance co-operation and competition at a more granular level—typically within one-to-one relationships between direct competitors (Bengtsson and Kock 2000). While such contradictions and tensions are present in broader value-net frameworks, they are more acute and observable in dyadic relationships. The Activity School emphasizes these aspects because they allow for a more straightforward analysis of co-opetition, where the focus is on understanding how organizations navigate these tensions within the simplest possible context. In short, the process of engaging in co-opetition is far from straightforward—Whether viewed through the lens of the Actor School, with its emphasis on dynamic networks and evolving roles, or the Activity School, with its focus on managing contradictory demands,

the complexity of co-opetition demands careful consideration and strategic management. Organizations must be adept at reconfiguring their relationships and interactions, continuously adapting to both internal and external changes, to successfully harness the benefits of co-opetition.

- **Outcome**

The outcomes of co-opetition can vary significantly from one organization to another, largely depending on the specific drivers and processes involved in the co-opetition strategy. Despite this variability, the results generally reveal both positive and negative consequences across several dimensions: innovation, performance, knowledge, and relational aspects. Innovation is one of the most frequently studied outcomes of co-opetition (e.g. Huang and Yu 2011). In which, it has repeatedly highlighted that the co-opetition can lead to significant improvements in innovation by combining resources and expertise from multiple organizations. Through coopetitive arrangements, firms experience competition, which exerts pressure to innovate, and co-operation, which facilitates the necessary knowledge sharing for innovation (Park, Srivastava, and Gnyawali 2014). Collaborative efforts often result in the development of new products or services, as partners leverage each other's strengths to overcome challenges and seize new opportunities. However, the effects on innovation can be mixed. While some studies suggest that a balance of moderate competition and high co-operation enhances innovation performance (Park, Srivastava, and Gnyawali 2014), other research indicates that coopetitive relationships with direct competitors and large firms might negatively impact innovation.

Furthermore, co-opetition often leads to notable improvements in performance (Liu et al. 2014) and market positioning (Wu 2014). By expanding their content catalogue or product offerings through partnerships, firms can enhance their competitive advantage and better define their market niche. This strategy allows firms to focus on specific market segments, resulting in clearer and more relevant marketing propositions. Although co-opetition facilitates access to new markets, it can also pose challenges, such as increased costs associated with partnering and the need to build brand awareness in new markets. Additionally, one of the significant benefits of co-opetition is access to valuable knowledge and resources. Partners can exchange insights, best practices, and technical expertise, which enhances their overall capabilities. This knowledge sharing is particularly advantageous in rapidly evolving industries where staying abreast of technological advancements and market trends is crucial. However, a key challenge in managing data quality through collaborative platforms is maintaining control over proprietary information. Organizations often prefer to use their own platforms to ensure data quality and protect sensitive information, which can significantly hinder the knowledge-sharing process.

Moreover, the relational aspect of co-opetition is equally critical when considering outcomes. While alliances can effectively achieve specific goals, they are typically not intended as long-term strategies. Organizations often form these partnerships to address particular objectives, making the strategic alignment of these alliances essential. Companies must carefully manage these relationships to ensure they remain aligned with their broader business goals. Scholars have extensively examined relationship-

specific outcomes such as trust and the maintenance of these relationships, with findings suggesting that these factors are crucial for sustaining cooperative alliances and achieving positive results. Trust and relationship maintenance are vital for realizing the benefits of co-opetition, including resource commitment and the successful achievement of shared goals. Research on cooperative alliances and joint ventures has explored various issues, such as partner commitment (Amaldoss et al. 2000), the role of learning in the maintenance or failure of alliances (Zhang and Frazier 2011), and the dynamics of trust, including its loss and recovery (Zerbini and Castaldo 2007). Given above, co-opetition can yield diverse outcomes, such as enhanced innovation, improved performance, and valuable knowledge sharing. However, the complexity of relational dynamics and the constant balancing act between competition and co-operation present ongoing challenges. Effective management of these aspects is essential to maximize the benefits of co-opetition while navigating its inherent risks.

2.4. Co-opetition in application

Despite the complexity and delicate involved in implementing and maintaining cooperative relationships, the co-opetition strategy has gained widespread acceptance and usage across a variety of industries. For instance, in the automotive industry, BMW and Daimler (the parent company of Mercedes-Benz)—fierce competitors in the luxury car market—formed a joint venture to develop autonomous driving technologies. They also collaborate on shared mobility services, such as car-sharing and ride-hailing, to better compete with tech giants like Uber and Google. This partnership allows them to pool resources for costly R&D, achieve faster innovation, share the burden of regulatory compliance, and work together to create industry standards (Team 2014).

Similarly, in the healthcare and pharmaceuticals sector, Pfizer and BioNTech exemplify co-opetition through their strategic partnership. Leveraging BioNTech's mRNA technology and Pfizer's global distribution network, they rapidly developed the COVID-19 mRNA vaccine. This collaboration facilitated rapid vaccine development, expertise sharing, accelerated regulatory approval, and enhanced distribution capabilities (Pfizer and BioNTech 2020). Ericsson and Nokia, major competitors in the telecommunications infrastructure market, also engage in co-opetition. They occasionally collaborate on standardizing 5 G technology and ensuring the interoperability of 5 G networks. This cooperation accelerates the development and deployment of 5 G technology, ensures global standards, and improves network compatibility (Rice and Galvin 2006).

In the retail and consumer goods sector, Costco and Sam's Club (owned by Walmart) engage in co-opetition by collaborating on supply chain logistics and sourcing to leverage bulk purchasing power. From an activity-centric perspective, their partnership is focused on specific operational efficiencies—such as shared logistics and procurement—while they continue to compete in areas closer to customer engagement, such as pricing and service differentiation. Similarly, in the energy sector, BP and Shell, despite being direct competitors in the oil and gas industry, collaborate on renewable energy initiatives, including offshore wind farms and carbon capture technologies. This co-opetition reflects an actor-centric approach, as these two major industry players align their strategic interests to collectively advance sustainability goals while maintaining distinct competitive positions in their core oil and gas operations (Roy, Bez, and Gast 2021). In

aerospace, SpaceX and Boeing, while competing for NASA contracts and commercial space missions, cooperate in setting industry safety standards and sharing technological advancements. Here, an activity-centric lens reveals that their collaboration is concentrated on non-competitive aspects such as regulatory compliance and knowledge-sharing in safety protocols, which enhance innovation without disrupting their primary market rivalry (Genta 2014).

Beyond these examples, co-opetition is evident across a diverse range of industries. In travel and hospitality, Marriott and Starwood have leveraged strategic alliances, while in agriculture, Monsanto (now Bayer) and BASF collaborate on various ventures. Similarly, in financial services, major banks such as JPMorgan Chase, Goldman Sachs, and Citibank, despite being market competitors, form partnerships that enhance operational efficiencies and customer service. Through an actor-centric lens, these alliances involve key industry players shaping market dynamics collectively, increasing the overall market size while later competing for market share. In contrast, an activity-centric view highlights how these firms selectively cooperate in areas that do not directly impact their competitive positioning, such as infrastructure sharing, technological investments, or regulatory standardisation. These diverse instances illustrate that co-opetition is not confined to a single sector but is a widely adopted strategy that fosters innovation, reduces costs, and drives industry-wide efficiencies. Moreover, while the underlying drivers of co-opetition vary, the strategic logic remains consistent: firms selectively collaborate to enhance efficiency and competitiveness while maintaining their distinct market positions.

As industries continue to evolve in response to rapid technological advancements and economic shifts, the ability to flexibly structure and reconfigure co-opetition relationships will be crucial for sustained success. Whether viewed from an actor-centric perspective—where firms leverage their influence to shape industry-wide change—or an activity-centric perspective—where collaboration is confined to specific non-competitive domains—co-opetition remains a vital strategic tool. This approach enables firms to harness each other's strengths while preserving their competitive differentiation, ultimately enhancing their market position. Co-opetition, therefore, stands out as a powerful mechanism for driving growth, fostering innovation, and ensuring long-term sustainability in an increasingly interconnected and complex business landscape.

3. Port co-opetition in citation

3.1. General

When discussing competitive dynamics, Keil, Laamanen, and McGrath (2013) emphasize that organizations must actively respond to changes in the competitive environment, either proactively or reactively. Standing still or opting out is not a viable option in the face of significant market changes, which demand adaptive responses. This concept is equally applicable across various industries, including the port sector. In the late 1990s, the port industry faced substantial challenges due to the evolving shipping landscape. During this period, shipping lines began forming alliances to enhance economies of scale, while vessel sizes increased significantly. These changes placed enormous pressure on port operations. Ports saw their bargaining power diminish considerably in the face of

powerful shipping alliances, and many lacked the infrastructure to accommodate larger vessels, leading to a significant loss of business to rival ports. In essence, like other organizations, ports were not insulated from competitive dynamics. These dynamics were driven by a combination of external 'push' from shipping lines and internal 'pull' from intra-port competition, collectively influencing strategic decision-making within the port sector.

In response to these pressures, the concept of port co-opetition emerged as a strategic approach in the early 2000s, particularly from an operational perspective (Song 2003). The 2003 paper was structured to capture this strategy during that era within the Asian container ports. The article focused on fostering co-operation among adjacent ports as a counterbalance to the increasing bargaining power of shipping lines. By pooling resources, sharing infrastructure, and enhancing collective bargaining power, ports were able to find themselves better positioned to manage competitive pressures and achieve greater operational efficiency. This co-operative approach enabled ports to navigate the complexities of the market, ensuring that they remained competitive and capable of meeting the evolving demands from the shipping industry as their counter party in the maritime industry.

The 2003 paper also argued that co-opetition provided ports with the significant advantage of risk-sharing. Joint investments, particularly in capital equipment and terminal development, have substantially reduced the financial risk shouldered by individual ports or port operators. Moreover, forming co-opetitive relationships with rival ports facilitates international expansion for port operators, better facilitating them to penetrate new geographic markets. In addition, potential competition can be mitigated by establishing strategic alliances with competitors. These alliances not only strengthen both partners against external threats but also enhance their overall competitiveness. By collaborating, ports benefit from increased capacity and more efficient utilization of resources. This strategy of joint competition results in a stronger negotiating position, even against government-imposed trade and investment barriers, as well as against mega-carriers and shipping alliances. Through co-opetition, ports have effectively addressed market complexities, ensuring they remain competitive and well-positioned to meet the evolving demands of the shipping industry and other stakeholders.

In the last two decades, however, the discourse on port co-opetition has evolved significantly beyond individual port co-operation to encompass co-opetition within port networks. For instance, Asadabadi and Miller-Hooks (2018) explore port co-opetition within Southeast Asia, focusing on enhancing network resiliency during natural or manmade disasters. Their study underscores how ports in the region collaborate to maintain operational continuity and mitigate risks. Furthermore, Asadabadi and Miller-Hooks (2020) analyse port network resiliency and reliability through co-opetition strategies. Their research highlights how cooperative efforts among ports can improve overall network performance and reliability, particularly under challenging conditions. Moreover, Zheng and Luo (2021) offer an insight into port co-opetition from a social welfare perspective, distinguishing between vertical and horizontal co-opetition. Vertical co-opetition involves hub ports and feeder ports with complementary relationships along transport routes, while horizontal co-opetition occurs between similar ports competing in overlapping hinterlands. Adding another dimension, Shi et al. (2023) propose measuring port co-opetition from the perspective of transport chains

extending from seaports to inland container ports, and Xu, Xie, and Wang (2022) attempt to apply it to port capacity sharing with a game theory. Their framework emphasizes the collaborative efforts needed to optimize transport efficiency and integrate logistical operations seamlessly.

In practice, ports around the world have adopted various co-opetition strategies to balance competition and collaboration. For example, the Ports of Los Angeles and Long Beach, while competing for market share in the same hinterland, collaborate on initiatives like the 'Clean Air Action Plan' to reduce air pollution and enhance environmental sustainability. They also jointly invest in infrastructure projects such as the Alameda Corridor, which improves rail connectivity to the national network. Additionally, these ports coordinate disaster preparedness and response planning to ensure collective resilience (Chris 2024). Similarly, the Port of Singapore and the Port of Tanjung Pelepas, both major transshipment hubs in Southeast Asia, engage in co-opetition by exchanging data to optimize vessel traffic management and alleviate congestion. They also conduct joint training programs to enhance the skills and safety standards of port personnel (Chang 2016). Furthermore, they have mutual aid agreements to provide assistance during emergencies like oil spills or accidents, reinforcing their commitment to operational reliability and safety. In Northern Europe, the Port of Gothenburg in Sweden and the Port of Aarhus in Denmark serve as vital trade gateways, significantly contributing to the region's economy. These ports embrace co-opetition to strengthen their operations and regional influence (Verhoeven 2020). Through collaborative marketing efforts, they promote the Nordic region as a premier logistics hub, attracting global trade. They also share best practices in port operations, security measures, and sustainability initiatives to collectively enhance efficiency and environmental performance. Additionally, they collaborate on infrastructure planning to improve connectivity between their facilities, facilitating smoother trade routes and bolstering the region's trade capabilities.

From a broader perspective, port co-opetition has noticeably evolved since its early operational origins, driven by pressures from shipping alliances and the increasing size of vessels in the early 2000s since the publication of the original 2003 paper. Initially, co-opetition focused on enhancing bargaining power and operational efficiency through resource pooling and infrastructure sharing. Today, it has expanded to include cooperative networks that cross port boundaries. Even further a few studies have highlighted its critical role in bolstering resilience and network reliability during crises and optimize performance under challenging conditions. Overall, port co-opetition has emerged as a crucial global strategy, fostering resilience, efficiency, and competitive advantage in today's increasingly complex market dynamics. While it might be an exaggeration to claim that the original 'Port Co-opetition in Concept and Practice' paper has completely redefined the way of port competition in research and practice, its contribution to directing attention toward a new domain within the port sector cannot be ignored. We are pleased to note that the 2003 paper has been well-received and widely cited across various disciplines, journals and geographical regions underscoring its relevance and impact.

3.2. Academic discipline

According to the ScienceDirect database, the article 'Port Co-opetition in Concept and Practice' (2003) has been cited across more than 10 different subject areas, showcasing its

wide-ranging applicability and interdisciplinary appeal. The citation distribution highlights the paper's impact in several fields: that is, Social Science (30%), Engineering (17%), Business, Management and Accounting (15%), Environmental Science (11%), Econometrics, Economics, and Finance (9%), Decision Science (8%), Computer Science (3%), and Other academic fields (7%). **Figure 5** presents those spreading academic disciplines.

In the realm of Social Science, the concept of co-opetition has been explored extensively within organizational behaviour, inter-firm relationships, and the societal impacts of business strategies. Researchers in this area have utilized the manuscript to gain insights into how cooperative and competitive dynamics shape social structures and organizational practices. In Business, Management, and Accounting, the manuscript's ideas have been instrumental in understanding strategic alliances, competitive strategies, and the financial implications of co-opetition, contributing to a deeper comprehension of how firms navigate complex competitive landscapes. In Econometrics, Economics, and Finance, the manuscript's insights have been applied to analyse market dynamics, risk-sharing mechanisms, and the economic benefits of collaborative competition. It provides a framework for understanding the financial and economic impacts of co-opetition strategies on market behaviour and organizational performance. Researchers in Decision Science have used the co-opetition framework to optimize decision-making

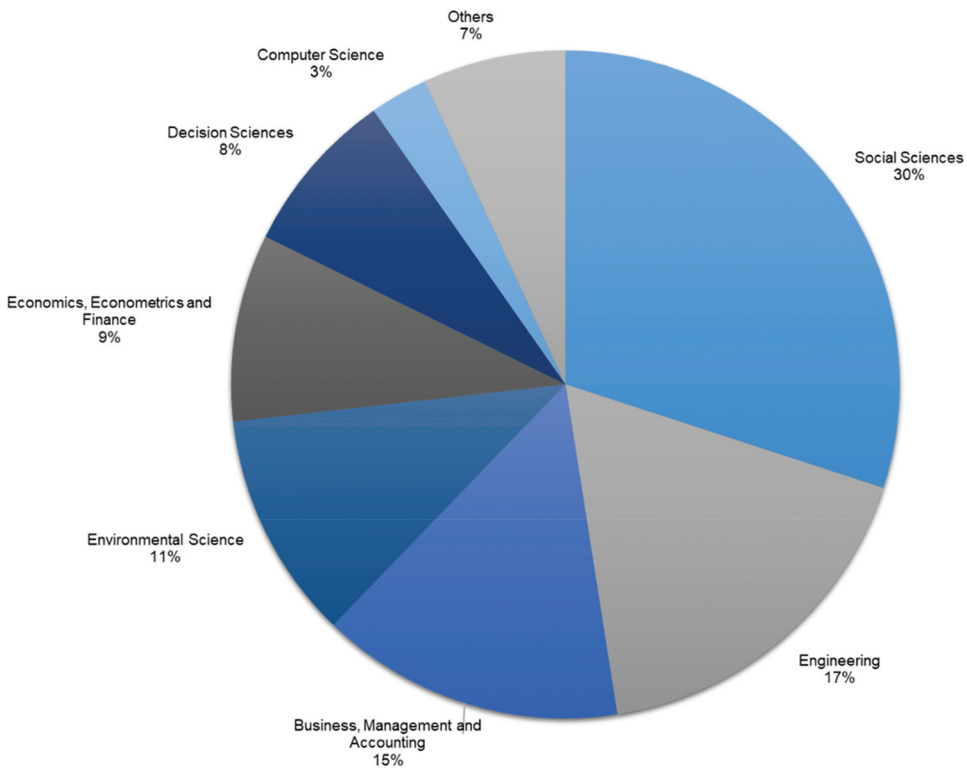


Figure 5. Citations in academic discipline. Source: Compiled by the authors

processes, resource allocation, and strategic planning, illustrating the manuscript's utility in enhancing decision-making efficiency.

Furthermore, environmental Science citations reflect the manuscript's relevance in addressing sustainability challenges, promoting environmental stewardship, and improving resource efficiency. Co-opetition strategies are explored as tools for achieving environmental goals and advancing sustainability practices. In Computer Science, the principles of co-opetition have supported the development of collaborative algorithms, network optimization, and data sharing, demonstrating the manuscript's influence on technological and computational advancements. Additionally, the 7% of citations in Other Subject Areas underscore the article's impact on diverse fields such as engineering, healthcare, and public policy, where co-opetition strategies are crucial for fostering innovation and solving complex problems. Overall, this broad citation pattern illustrates the manuscript's significant impact across multiple disciplines, highlighting its foundational role in understanding and applying co-opetition strategies in various contexts.

3.3. Cited journals

According to the ScienceDirect database, the manuscript on port co-opetition has garnered significant attention, being cited in over 72 journals over the past two decades. This level of citation is indicative of its substantial influence and relevance across multiple disciplines. Notably, as illustrated in Figure 6, a significant portion of these citations—over 40%—comes from leading journals in the fields of maritime logistics and transport research. These include highly regarded publications such as *Maritime Policy and Management*, *Maritime Economics and Logistics*, *Transportation Research: Part A, B, and D*, and *Transportation Science*.

The prominence of citations from these journals highlights the manuscript's critical role in shaping contemporary discourse and research in maritime logistics and transport. These fields are central to the global economy, and the insights provided by the manuscript have evidently resonated with researchers and practitioners alike, contributing to a deeper understanding of the strategic dynamics at play in port operations and competition. The manuscript's influence extends beyond merely being a source of information; it has provided a foundational framework for analysing and implementing co-opetition strategies within the port and maritime sectors. The frequent citations in these specialized journals suggest that the manuscript has become a touchstone for further research, with scholars building on its concepts to explore new dimensions of co-opetition, port strategy, and logistics management.

Moreover, the impact of the manuscript is not limited to academia. The practical implications of its findings have likely influenced industry practices, as ports and maritime operators face increasingly complex competitive and collaborative landscapes. The concepts of risk-sharing, joint investments, and strategic alliances—key themes discussed in the manuscript—have found their way into the operational strategies of ports worldwide, as they navigate the challenges of globalization, technological advancements, and shifting economic conditions. The widespread recognition of the manuscript, as evidenced by its extensive citation in high-impact journals, underscores its lasting value. It has provided a robust theoretical foundation for understanding the intricate balance between competition and co-operation in the

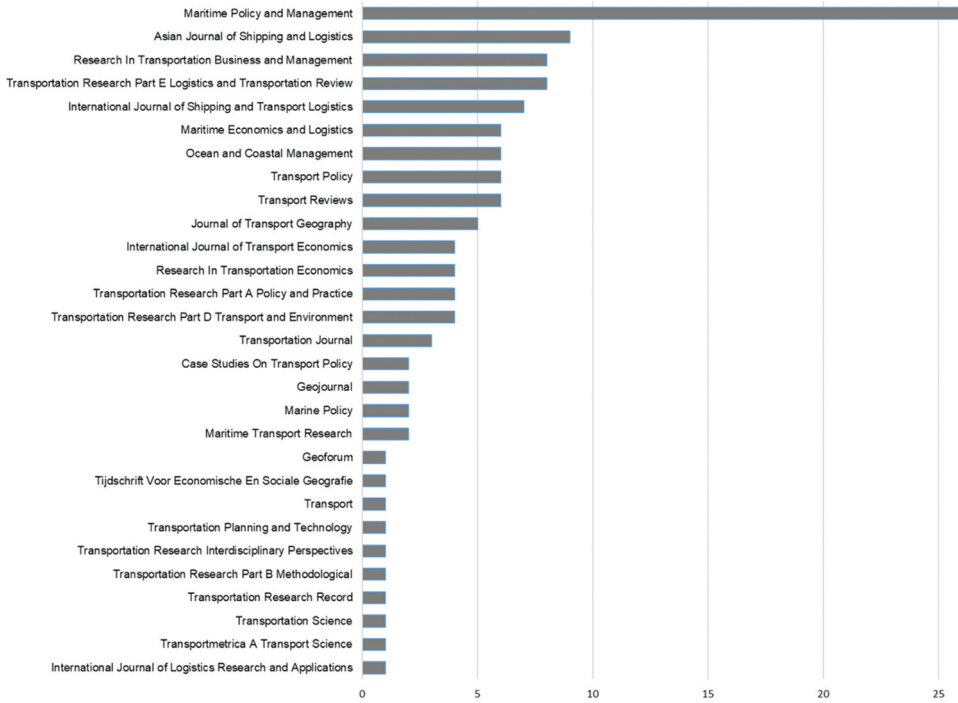


Figure 6. Citations by journals. Source: Compiled by the authors

port industry, while also offering practical guidance for industry professionals seeking to optimize their operations. As such, the manuscript has not only contributed to academic scholarship but has also had a tangible impact on the evolution of port management practices in an increasingly interconnected and competitive global economy.

3.4. Geographic regions

The geographic regions citing the work are illustrated in [Figure 7](#). Notably, a substantial portion of citations originates from Asia (approximately 43%) and Europe (around 40%), while a marginal proportion comes from North and South Americas, and Middle East. It is naturally understandable that the ports located at the European and Asian regions have been traditionally playing a major role in the global port and maritime logistics sector. This broad distribution of citations vindicate the paper’s influence on the international scale. It is highlighted that the 2003 paper makes a certain role when advancing our understanding and application of co-opetition strategies within port and other business sectors. The widespread recognition and relevance of the work across these diverse regions acknowledges that the 2003 work has been valued in shaping contemporary research and practices in relevance to strategic co-operation and competition, exhibiting its enduring impact on the academic and practical dimensions of port, logistics management and beyond.

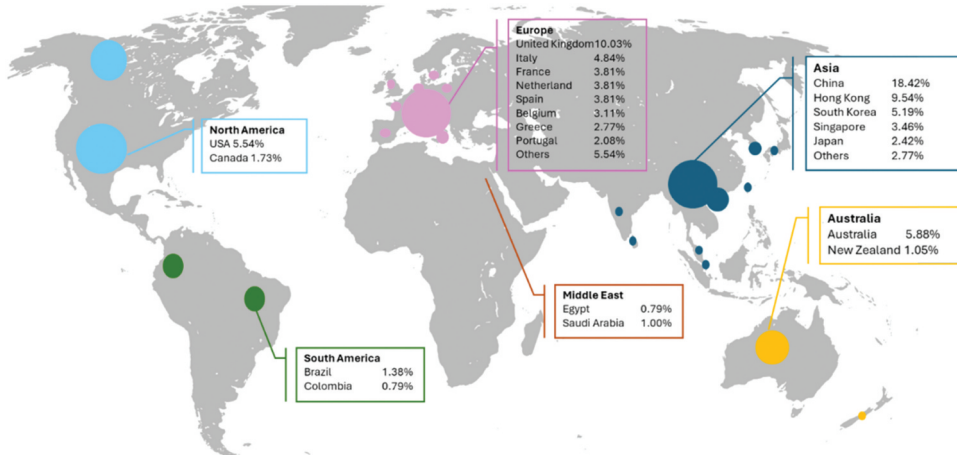


Figure 7. Geographical distribution of citations. Source: Compiled by the authors

4. Port Co-opetition: a way forward

As outlined in section 2, the concept of co-opetition has seen substantial evolution over the past two decades, reflecting a deeper understanding of the complex interplay between collaboration and competition among organizations. Research in management studies, particularly within the realm of strategic management, has shifted from a simplistic actor-focused perspective to a more intricate activity-based perspective. In other words, studies on co-opetition were initially centred on the roles and interactions of individual actors—companies, customers, suppliers, competitors, and complementors. This early focus primarily addressed how these actors engage in both co-operative and competitive behaviours to achieve their strategic goals. As the field has become matured, however, scholars have increasingly recognised the need to explore the dynamics of co-opetition beyond mere actor interactions. Recent research has emphasized the challenges involved when multiple firms collaborate while competing, particularly in formulating and managing the processes and activities that underpin these relationships. This shift has led to a greater focus on the ‘process’ of co-opetition, examining how organisations navigate and balance co-operation and competition within their strategic frameworks.

In parallel, the research on port co-opetition has evolved from its initial operational origins. Early research primarily focused on basic forms of vertical and horizontal collaboration, investigating how ports interacted with shipping lines and terminal operators or collaboration between hub and feeder ports. These studies were instrumental in understanding the foundational drivers of port co-opetition and how ports initially began to form strategic alliances to address operational challenges and enhance efficiency. Yet, despite advancements in co-opetition research and its expanding scope within strategic management studies, the port domain lags significantly behind. Studies in this area do continuously focus on actor-centric aspects of co-opetition. As illustrated in Figure 2, this approach examines how individual ports and their partners engage in both cooperative and competitive activities. The actor-centric perspective explores the roles and interactions of specific ports within their networks, highlighting how these entities manage the balance between collaboration and competition to achieve their strategic goals. This

approach also looks at how different levels of co-opetition—such as dyadic, triadic, or network-based interactions—affect overall strategic outcomes. While the actor-centric perspective has offered a valuable insight into the direct relationships between ports and their partners, there remains considerable potential to explore how these relationships integrate into broader strategic management frameworks.

To advance the understanding and applicational potential of port co-opetition, future research could benefit from incorporating additional perspectives moving from the actor-centric view. For instance, exploring the activity-based dimensions of co-opetition—such as how ports collaborate on specific operational activities while competing in others—could offer deeper insights into the complexities of port collaboration and competition. Additionally, examining the strategic alignment of co-opetitive relationships at various levels and in different contexts could enhance our understanding of how ports navigate these dynamics to achieve both operational and strategic success. Furthermore, given the crucial role ports play in the global logistics and supply chains, there exists a significant potential for ports located within the same region to adopt co-opetition strategies that enhance the quality and/or efficacy of their logistics services. This could involve sharing resources, optimizing infrastructure, and jointly developing new (inland) services that benefit both parties while maintaining competitive advantages in other areas.

The field of strategic management has increasingly focused on balancing collaboration across various activities while maintaining competition at the customer interface. This approach can be also applicable to port co-opetition by encouraging ports to collaborate on joint ventures and resource-sharing initiatives, while still competing to attract business from shipping lines and logistics service providers. Such collaboration can extend to areas like hinterland connectivity, environmental sustainability, and social responsibility. For example, ports might work together to develop integrated transport solutions that enhance overall service capacity, quality and efficiency. On the environmental front, which has become a major global concern, ports can collaborate to develop and share technologies aimed at reducing greenhouse gas emissions and minimizing environmental impact. By pooling their resources and expertise, ports can implement sustainable practices more effectively and contribute to broader environmental goals. In addition, the application of the co-opetition concept to the field could offer its stakeholders an opportunity as a way to address social dimensions. Ports could collaborate to improve community relations, enhance labor practices, and support local economic development. Balancing operational goals with responsibilities to local communities is becoming increasingly important for ports, making these social dimensions a vital aspect of co-opetition.

Moreover, there is a significant research gap in the port domain regarding the specific 'levels' and 'types' of co-opetition between two or more ports. While co-opetition has been broadly studied in relation to various ports, the dynamic nature of co-opetition between individual ports has been relatively underexplored. The dynamic framework discussed in Section 2.2 provides a valuable foundation for examining and measuring co-opetition at this level. This framework could be instrumental in identifying the nuances of co-opetition between ports, including how different forms of collaboration and competition impact their strategic outcomes. Research into the levels of co-opetition between ports could offer insights into how various co-opetitive strategies might produce

different benefits depending on the geographical region. For example, ports in regions with high logistical complexity or intense competitive pressure might experience greater advantages from specific types of co-opetition compared to others. Understanding these dynamics could help ports optimize their strategies to enhance operational efficiency, improve service offerings, and strengthen their competitive positions. Additionally, based on the same framework, exploring co-opetition between different terminal operators within the same port presents another intriguing research opportunity. Terminal operators, each with distinct operational focuses and competitive strategies, may exhibit interesting dynamics when collaborating on certain aspects of port operations while competing in others. Investigating these interactions could provide valuable insights into how terminal operators balance co-operation and competition to achieve mutual benefits while maintaining their individual competitive edges.

Finally, recent studies in strategic management (e.g. Bengtsson, Raza-Ullah, and Vanyushyn 2016; Hoffmann et al. 2018; Ouyang, Liu, and Gui 2023) have advanced the field by analysing the cognitive abilities of executives when managing competitive practices. This area of research explores how decision-makers perceive and respond to competitive pressures and collaboration opportunities for an industrial and/or social psychological perspective. Applying this perspective to port co-opetition could offer a deeper understanding of how the cognitive and strategic decision-making processes of port managers and/or port authorities influence the implementation and success of co-opetitive strategies in their own unique context. Given the hierarchical nature of port management and the involvement of multiple stakeholders—such as private operators and government bodies—examining these cognitive aspects could provide valuable insights into how ports navigate complex cooperative relationships.

5. Concluding remarks

This paper has addressed two key issues surrounding the co-opetition concept: what has been accomplished thus far and what needs to be pursued in the future. The former is of retrospective, while the latter of prospective. In alignment with these objectives, the current study has explored the evolution of its concept and applications within strategic management in general and within the port industry in particular. The research delves into the shifting landscape of co-opetition, examining both actor-centric and activity-centric perspectives. The understanding of co-opetition has expanded to encompass the processes and activities that shape and drive these viewpoints. This evolution highlights a growing recognition of the complexity and dynamic nature of co-opetition, which is increasingly viewed as a strategic necessity in today's interconnected and rapidly changing global economy. The paper is expected to make a meaningful contribution towards deeper understanding of how co-opetition has developed over time and its critical role in navigating the challenges and opportunities that lie ahead.

Initially, co-opetition was viewed largely through the lens of the actor school of thought, where the emphasis was on how individual firms engaged in both cooperative and competitive behaviors to maximize their own advantages. This perspective, while valuable, often oversimplified the intricate balance required to maintain such dual relationships. Recent research, however, has increasingly highlighted the importance of understanding the specific activities and processes that underlie these

relationships. The activity school of thought, which focuses on how firms collaborate on certain activities while competing on others, offers a more nuanced view of co-opetition that is better suited to the complexities of modern business environments.

The study of port co-opetition has mirrored this broader evolution in the conceptualization of co-opetition. Initially, research on port co-opetition focused on basic forms of vertical and horizontal collaboration, often emphasizing operational co-operation between ports and their key partners, such as shipping lines and terminal operators. This early work provided important insights into how ports could work together to improve efficiency and competitiveness in response to external pressures, such as the increasing size of vessels and the growing power of shipping alliances. However, as the global maritime industry has continued to evolve, so too has the understanding of port co-opetition. The scope of research has expanded to include not only the operational aspects of port co-operation but also the strategic and managerial dimensions of these relationships. Despite this progress, much of the existing literature remains anchored in the actor-centric perspective, with relatively little exploration of the activity-based aspects of port co-opetition. This represents a significant gap in the literature and an opportunity for future research to explore how ports can engage in activity-based co-opetition to achieve mutual benefits.

By conceptualizing co-opetition as a strategic framework, the paper has also advanced our understanding of how organizations can navigate the dual imperatives of co-operation and competition in complex, dynamic environments. The citation trajectory is a testament to its foundational role in shaping the discourse on port co-opetition. Its insights remain relevant today, continuing to guide and inspire ongoing research efforts. This ongoing interest highlights the importance of collaborative strategies in enhancing resilience, competitiveness, and sustainable growth within the port industry and across other sectors facing similar challenges.

Despite well articulated advantages, the success of co-opetition strategies in the port industry is not guaranteed. The complex and dynamic nature of these relationships requires careful management and a thorough understanding of the strategic, operational, and relational dimensions involved. This research has highlighted the importance of moving beyond the actor-centric perspective to explore the activity-based aspects of co-opetition, which remain under-researched in the port context. By focusing on specific activities where collaboration can yield the greatest benefits, ports can develop more effective co-opetition strategies that align with their overall business goals. In addition to advancing the understanding of port co-opetition, this research also suggests that there exists a significant potential for further exploration of the cognitive abilities of port management teams in executing co-opetition strategies. The large portion of world ports are divided across multiple hierarchical systems, in terms of governance structure and ownerships, often involving both private and public entities individually as well collectively. Understanding how these managements perceive and implement co-opetition strategies at the ground level could provide a valuable insight into the factors that contribute to the success or failure of these initiatives. Those frameworks suggested in this paper would be a useful scheme with which such a relatively uncharted territory of port management and operations could be unveiled as a way to better understand a strategic movement being taken place in the practice.

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