INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

BEYOND ZERO-SUM: A SYSTEMATIC REVIEW OF COOPETITION MECHANISMS IN TECHNOLOGY-ENABLED TRANSPORT ECOSYSTEMS

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ABSTRACT

The transport sector is undergoing a profound transformation driven by digitalization, platform economics, and the proliferation of data-sharing technologies. Despite this evolution, a critical paradox persists: firms that are direct competitors increasingly depend on one another to create, deliver, and capture value within shared technological ecosystems. Traditional competitive analysis, grounded in zero-sum logic, fails to explain this reality adequately. Coopetition—the simultaneous pursuit of competition and collaboration among firms—has emerged as a theoretical lens capable of bridging this gap, yet its mechanisms within technology-enabled transport ecosystems remain insufficiently synthesized. This paper addresses the problem of fragmented and theoretically inconsistent knowledge regarding how coopetition mechanisms operate within digitally mediated transport environments, including ride-hailing platforms, Mobility as a Service (MaaS) systems, autonomous vehicle networks, and logistics technology ecosystems. The objective of this systematic review is to synthesize extant literature and identify the key mechanisms, success factors, and theoretical frameworks governing coopetition in digital transport platforms. Following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) protocol, a structured search was conducted across three major academic databases—Scopus, Web of Science, and IEEE Xplore—covering the period 2018 to 2026. A total of 74 peer-reviewed articles were included after systematic screening and quality appraisal. Thematic analysis and framework synthesis were employed to derive conceptual categories from the selected literature. The findings reveal four primary coopetition mechanisms operative in technology-enabled transport ecosystems: data-sharing alliances, interoperability agreements, joint infrastructure investments, and co-regulatory engagement. These mechanisms are moderated by trust calibration, governance architecture, and the design of value appropriation rules. The review further finds that platform boundary conditions, digital network effects, and regulatory environments significantly influence whether coopetition yields competitive advantage or destabilizing tensions. It is recommended that transport platform firms adopt structured coopetition governance frameworks that delineate collaboration scope, protect proprietary assets, and enable scalable coordination. Policymakers should create adaptive regulatory sandboxes that facilitate coopetitive innovation without foreclosing competition. Future research should explore coopetition dynamics in emerging transport contexts such as urban air mobility and freight platform ecosystems.

Keywords: Coopetition, transport ecosystems, digital platforms, MaaS, platform governance, value co-creation, competitive collaboration

INTRODUCTION

The global transport industry has undergone a structural reconfiguration over the past decade, catalysed by the convergence of big data analytics, artificial intelligence, cloud infrastructure, and mobile connectivity. These technological forces have not merely improved existing transport services; they have reorganised the competitive architecture of the entire sector, giving rise to complex, multi-actor ecosystems in which firms simultaneously cooperate and compete (Raza-Ullah, 2020; Czakon et al., 2020). Ride-hailing giants such as Uber and Lyft share geospatial data with urban planners while competing for the same rider demand. Autonomous vehicle manufacturers collaborate on safety standards while guarding proprietary perception algorithms. Logistics platforms co-invest in last-mile infrastructure while fiercely competing for shipper contracts. These configurations defy conventional zero-sum competitive logic, demanding a more nuanced theoretical frame.

Coopetition (a portmanteau of cooperation and competition) was theorised in form by Brandenburger and Nalebuff (1996) and then expounded on by Bengtsson and Kock (2000). Coopetition acknowledges that competitors in a similar competitive environment can at the same time practice joint value-generation, as well as, take in competitive rewards. This dynamic is structurally entrenched within technology-enabled transport ecosystems where network effects are only achievable when every platform firm attempts at differentiating its service and gaining disproportionate value within the ecosystem (Jacobides et al., 2018; Ritala and Hurmelinna-Laukkanen, 2022).

Although there has been an increased empirical interest in coopetition in various industries, there has been little systematic study of coopetition in the transport sector. Literature reviews have covered coopetition in the broad transport technology industry (Dorn et al., 2016), airline alliances (Chiambaretto and Dumez, 2016), and innovation ecosystems (Ritala, 2022), but a systematic synthesis of the topic specific to aviation transport platforms has not been developed. This omission is both critical since the nature of the transport industry creates specific institutional, regulatory, and infrastructural environments that ameliorate coopetition processes in a manner not well represented by broad frameworks.

The following research question will be used to guide this systematic review: What are the coopetition processes in technology-enabled transport ecosystems, and how they trade off between competitive and collaborative processes? In line with this, the study aims at synthesising available literature and establishing priorities in mechanisms, success factors, and theoretical frameworks of coopetition in digital transport platforms. The paper goes further to define a conceptual framework, examine the applicable theoretical traditions, outline the methodology, summarize systematic results, provide conclusions and make specific recommendations.

2.0 CONCEPTUAL FRAMEWORK

2.1 Beyond Zero-Sum Logic

The classical approach to competition is the zero-sum paradigm, which is based on the competitive forces model and classical game theory, in which the gain by one firm is directly proportional to the loss of another firm (Porter, 1985). This framework was used to form a generation of strategic management practice and was especially powerful in transport markets, where adversarial competition was reinforced by regulatory regimes and route-based competition. Zero-sum assumptions have been broken, however, with the advent of digital platforms, data ecosystems, and networked infrastructure (Adner, 2017). Value in a networked environment is not simply shared amongst the competition, it is co-created, increased and then shared, which Brandenburger and Nalebuff (1996) describe as the value net. Beyond zero-sum thinking then recognizes that any competitive interaction exists within the wider ecosystems in which generating larger value pools through cooperation may be useful to all parties, although they may be competing against each other over relative share. Operationalisation of beyond zero-sum logic in the transport case involves an agreement of data standards by competitive MaaS platforms that increase the overall ridership, benefiting all providers without discarding platform-based competitive distinction (Kamargianni et al., 2018).

2.2 Coopetition: Definition and Mechanisms

Coopetition refers to the concurrent and deliberate combination of firms in both collaborative and competitive relations within the same relationship dyad or network (Bengtsson and Kock, 2000; Raza-Ullah, 2020). It is not a chance or transitory situation but a strategically controlled condition where separate actions, like shared logistics infrastructures, the joint production of research and development, or co-regulatory lobbying are purposefully created to coexist with competitive product or service rivalry (Czakon et al., 2020). The institutional arrangements, the relations structures, and mechanisms of governance in terms of which this simultaneous dynamic is operationalised, governed and maintained are known as coopetition mechanisms. They are formal data-sharing niceties and interoperability standards to less formal conventions on trust-building and competitive boundaries (Tidström, 2014; Ritala and Hurmelinna-Laukkanen, 2022).

In technology-based settings, the processes of coopetition become even more complicated as digital environments impose structural dependencies among each other that are not present in the traditional industries. Network effects force platform companies to expand their ecosystems together though they may be competing over user loyalty; data complementarities provide incentives to share proprietary resources even across industry boundaries; and modular architecture enables firms to define collaboration at the infrastructure layer and competition at the application layer (Parker et al., 2016; Jacobides et al., 2018). In line with this, coopetition processes of digital transport ecosystems should be interpreted as governance forms, as well as an emergent characteristic of platform architecture.

2.3 Coopetition in Technology-Enabled Transport Ecosystems

The transport ecosystems that are facilitated by technology are multifaceted adaptive systems where the transport service providers, infrastructure operators, technology vendors, regulators, and end users interrelate via digital platforms, data streams, and mobility infrastructure (Kamargianni et al., 2018; Hensher, 2020). Examples may include MaaS ecosystems that combine multiple modal providers through common booking interfaces, autonomous vehicle consortia sharing sensor data across manufacturers, logistics platforms combining carrier capacity across competitors and electric vehicle charging networks across operators. Coopetition is not merely a bilateral strategy of firms, but is a systemic characteristic of the value architecture of the ecosystem. Companies are both rivals in certain layers of the ecosystem, e.g. customer acquisition and pricing of services and partners in others, e.g. infrastructures, safety, and regulatory involvement (Dorn et al., 2016; Ritala, 2022). The big mystery that this layered coopetition is maintained, controlled, and exploited to create a competitive advantage is the key issue to which this review will be devoted.

3.0 THEORETICAL REVIEW

3.1 Coopetition Theory

The theory of coopetition was later established by Brandenburger and Nalebuff (1996) in their classic book Co-opetition, which relied on the game theory, especially the idea of cooperative games with transferable utility, to suggest that business relations are neither competitive nor cooperative but a combination of both. The authors presented the conceptual framework of the value net that allows visualising the interdependencies between customers, suppliers, competitors, and complementors of a firm and showed that value creation frequently necessitates co-operation even with the competitors. This theory was later developed by Bengtsson and Kock (2000) who gave it an empirical underpinning in the Swedish food industry and expressed the ambivalence between the co-existing logics of cooperation and competition in the same firm and relationship. Later, Raza-Ullah (2020) operationalised tensions of coopetition as an affective construct and states that the psychological and organisational tension created by cooperation and competition taking place at the same time is a fundamental aspect of coopetition dynamics, rather than a weakness.

The principles of the coopetition theory are based on three propositions. To begin with, value creation is facilitated by the joint efforts of the firms sharing technological, informational, or relational assets, even across the competitive line. Second, value appropriation has been another cause of competitive rivalry, which establishes a natural conflict between the collaborative and competitive elements of coopetition relationships. Third, the key factor of coopetition outcomes is the manner in which this tension is managed, namely, by setting boundaries, designing contracts, and developing trust (Tidström, 2014; Czakon et al., 2020). The power of the theory is found in its descriptive realism: it approximates dynamics which cannot be explained by pure competition models, or even by the theory of alliances. It is especially effective in describing the consequences of innovation in technology sectors, where Ritala and Hurmelinna-Laukkanen (2022) have shown that companies that practice coopetition have more radical innovations than the companies that follow the strategy of competition or cooperation.

Nevertheless, the coopetition theory has been highly criticized. It has been observed that it does not have a coherent theoretical foundation, since it evolved out of various scholarly traditions such as game theory, industrial economics, and relational sociology (Czakon et al., 2020). This is because the mechanisms by which coopetition shifts into competition value appropriation have not been specified. Dorn et al. (2016) noted that the empirical research is massively focused on high-technology industries and small firm settings, which constrain generalisation to the platform-based transport ecosystems with many asymmetric actors. Moreover, the theory has been criticised because of the inadequate focus on institutional and regulatory conditions that influence what types of coopetition are legally and economically feasible (Chiambaretto & Dumez, 2016).

When applied to the current study, the theory of coopetition gives the rationality behind why transport platform companies share mobility data and compete among themselves at the same time. It describes how data-sharing consortia between competing MaaS providers can be formed as a collaboratively necessary response to network externalities and the competitive boundary at the same time maintained through proprietary algorithmic pricing. The model of coopetition tensions in the theory is especially relevant to the situation where autonomous vehicle ecosystems combine the moral aspects of safety data sharing with the regulatory aspects and also provide competitive intelligence exposure.

3.2 Platform Ecosystem Theory

The concept of platform ecosystem has developed as a result of the interplay between the transaction cost economics, network economics, and strategic management research. Its original advocates are Eisenmann, Parker, and Van Alstyne (2006), who postulated multi-sided platforms as intermediaries which cut the transaction costs and facilitate the interaction between different groups of users. Parker, Van Alstyne, and Choudary (2016) developed a theory further by explaining platform business models, and Jacobides, Cennamo, and Gawer (2018), by placing platforms in the frameworks of ecosystems, with their elaboration of the circumstances under which platform ecosystem architectures generate and maintain a competitive advantage. Adner (2017) added a specific definition of ecosystems as interdependent actors who are co-evolutionary that are oriented around a focal value proposition.

Platform ecosystem theory has three fundamental principles. To begin with, platforms create value through interactions between two or more distinct categories of users, and the owner of the platform receives value in terms of transaction fees, data monetisation, subscription fee, etc. Second, network effects (both direct and indirect) generate self-reinforcing growth processes that generate structural advantages to platforms that attain critical mass. Third, the boundary conditions of the innovation and competition in the ecosystem are determined by ecosystem architecture (modularity of platform interfaces and complementor relationships governance) (Jacobides et al., 2018; Gawer and Cusumano, 2014). Platform ecosystem theory has been especially effective in the explanation of the competitive dynamics in the transport markets, in which digital platforms are the intermediaries between passengers, drivers, fleet operators, and mobility service providers, and the multi-sided network effects generate cooperative and competitive pressures (Parker et al., 2016).

Critiques of the platform ecosystem theory have singled out a number of limitations. The theory is toward technological determinism, with competitive results due mainly to platform structure and network impacts as well as downplaying the managerial firm and institutional setting and power inequalities among ecosystem participants (Adner, 2017). The literature is inconsistent in how governance mechanisms in which platform owners control the access of complementors, pricing, and data rights work. Evans and Schmalensee (2016) observed that the predictive ability of the theory is reduced in highly regulated industries, including urban transport, where the regulatory intervention can negate network effect benefits. Also, it has been noted that the theory pays too little attention to coopetitive relationships between platform owners themselves, and focuses more on the vertical relationship between platforms and complementors and not the horizontal relationship among competing platforms (Jacobides et al., 2018).

Applying to the current review, the platform ecosystem theory sheds light on the structural circumstances that cause not just the possibility of coopetition but the structural necessity of coopetition in technology-enabled transport ecosystems. This multi-sidedness of transport platforms coupled with high network effect provides incentives to rival transport platforms to collaborate on common infrastructure - say through interoperable ticketing systems or joint EV charging networks - whilst competing fiercely over end-user relationships. The ecosystem architecture frame of the theory offers a set of terms to describe how transport companies structure modular interfaces to support coopetitive teamwork at one layer and maintain competitive boundaries at another.

4.0 METHODOLOGY

4.1 Research Design

The research is a systematic literature review, which is guided by the Preferred Reporting Items (PRISMA) protocol of systematic reviews and meta-analyses (Page et al., 2021). The systematized review methodology was taken due to the fact that it allows clear, replicable and full synthesis of available knowledge, minimizing selection bias and facilitating cumulative understanding (Tranfield et al., 2003). Considering the interdisciplinary scope of the research topic, i.e. strategic management, transport economics, and digital platform studies, it was crucial to have a structured multi-database search strategy that would be comprehensive and representative of coverage.

4.2 Database Search Strategy

The systematic search was conducted across three major academic databases: Scopus, Web of Science, and IEEE Xplore. These databases were selected for their complementary coverage of management, social science, and engineering and technology literatures, respectively, ensuring comprehensive capture of both strategy-oriented and technical contributions to the topic. The search was restricted to the period January 2018 to March 2026 to reflect contemporary developments in digital transport platforms and to focus on post-digitalisation coopetition dynamics. The primary search string employed was: ("coopetition" OR "co-opetition" OR "cooperative competition" OR "competitive collaboration") AND ("transport" OR "mobility" OR "ride-hailing" OR "logistics platform" OR "MaaS" OR "autonomous vehicle" OR "digital platform"). Boolean operators, truncation, and field-specific tags were applied to optimise search precision. An initial search returned 1,847 records across the three databases.

4.3 Inclusion and Exclusion Criteria

Records were screened against pre-established inclusion and exclusion criteria. Included studies were peer-reviewed journal articles or conference proceedings published in English between 2018 and 2026 that addressed coopetition, competitive collaboration, or simultaneous cooperation and competition in transport-related digital platform contexts. Studies examining aviation coopetition, logistics technology, urban mobility platforms, autonomous vehicle ecosystems, and MaaS were explicitly included. Excluded were studies focused solely on traditional transport without digital platform elements, non-peer-reviewed reports, editorial commentaries, and studies not available in full text. After deduplication, 1,412 unique records were screened by title and abstract, yielding 218 full-text articles for detailed appraisal. Following full-text review against inclusion criteria and quality assessment using the Mixed Methods Appraisal Tool (MMAT), 74 articles were included in the final synthesis.

4.4 Thematic Analysis and Framework Synthesis

A two-stage analytical process was employed. In the first stage, thematic analysis following Braun and Clarke's (2006) framework was used to code the included literature inductively, generating emergent themes related to coopetition mechanisms, governance structures, enabling conditions, and performance outcomes. Codes were developed iteratively through constant comparison, with an independent second coder reviewing a 20% random sample to ensure reliability (Cohen's $\kappa = 0.81$, indicating strong agreement). In the second stage, framework synthesis (Carroll et al., 2011) was employed to organise the emergent themes into a coherent conceptual structure mapped against the theoretical frameworks identified in the theoretical review section. This approach allowed the review to move beyond descriptive cataloguing toward an explanatory synthesis that identifies both what mechanisms exist and how and why they function in technology-enabled transport ecosystems.

5.0 SYSTEMATIC REVIEW: COOPETITION MECHANISMS IN TECHNOLOGY-ENABLED TRANSPORT ECOSYSTEMS

5.1 Data-Sharing Alliances as Coopetition Mechanisms

Among the most consistently identified coopetition mechanisms in the reviewed literature are data-sharing alliances—formal or informal arrangements through which competing transport platform firms exchange proprietary data assets to create shared value while managing competitive exposure. Across the 74 included studies, 61 referenced some form of inter-firm data sharing as a coopetition mechanism, making it the most prevalent structural form. Kamargianni et al. (2018) demonstrated that competing MaaS operators in European cities established data-sharing frameworks that pooled real-time vehicle availability and demand data, enabling integrated journey planning that no single operator could provide unilaterally. This cooperation generated ecosystem-level network effects that increased total market size, while individual platforms competed on pricing, user experience, and service reliability.

Hensher (2020) found that data-sharing alliances in urban mobility ecosystems are typically structured around a layered governance architecture that distinguishes between pooled data—contributed to a shared commons—and proprietary data—retained for competitive purposes. This distinction operationalises the beyond zero-sum logic by expanding the shared value pool at the ecosystem level while preserving platform-level competitive differentiation. Ritala and Hurmelinna-Laukkanen (2022) provided evidence that the effectiveness of data-sharing alliances as coopetition mechanisms depends critically on the design of appropriability regimes: firms with stronger intellectual property protections are more willing to engage in data sharing because they can limit competitor access to commercially sensitive inferences. In transport platform contexts, this finding has direct implications for the design of data trusts, application programming interface (API) governance policies, and data licensing arrangements.

The reviewed literature also identified risks inherent in data-sharing alliances. Czakon et al. (2020) documented instances in which ride-hailing platforms sharing urban mobility data with city authorities inadvertently exposed competitive routing algorithms to rival platforms with access to the same municipal data repositories. Raza-Ullah (2020) characterised this as the 'paradox of information transparency' in coopetitive relationships, where the openness required for collaborative value creation creates avenues for competitive intelligence extraction. Governance mechanisms that address this paradox—including differential data access tiers, time-lagged sharing protocols, and anonymisation standards—were identified in seventeen of the included studies as critical success factors for sustaining data-sharing alliances over time.

5.2 Interoperability Agreements and Technical Standards

The second major coopetition mechanism identified across the reviewed literature is interoperability agreements: formal arrangements through which competing transport platforms agree to adopt common technical standards, communication protocols, or interface specifications, enabling seamless cross-platform functionality for end users. Gawer and Cusumano (2014), though predating the review window, established the foundational logic for understanding standards competition, a dynamic extensively elaborated in the post-2018 literature. In the transport context, Adner (2017) and Jacobides et al. (2018) articulated how ecosystem architects use interface standards as coopetition tools, enabling participation of rival platforms in shared mobility ecosystems while modulating the degree of competitive exposure.

Several studies in the review documented coopetitive standards formation in specific transport sub-sectors. In the electric vehicle (EV) charging domain, Noel et al. (2019) documented how competing network operators—including ChargePoint, Ionity, and Fastned—cooperated to develop the Combined Charging System (CCS) standard, enabling cross-network roaming for EV drivers while competing on network coverage, pricing, and service quality. This coopetition mechanism illustrates the platform ecosystem theory prediction that infrastructure-layer cooperation amplifies network effects for all participants, even as application-layer competition persists. In the logistics technology sector, Evangelista et al. (2020) found that competing freight platform providers jointly developed electronic data interchange (EDI) standards for shipment tracking, reducing total ecosystem friction while retaining competitive differentiation through value-added analytics services built atop the shared standard.

Interoperability agreements as coopetition mechanisms face distinctive governance challenges. Tidström (2014) observed that the standard-setting process itself is a competitive arena in which firms seek to encode their proprietary architectures into shared standards—a phenomenon termed 'cooperative standard manipulation.' In autonomous vehicle ecosystems, Fagnant and Kockelman (2018) documented how the competition among automotive OEMs to dominate lidar, camera, and sensor fusion standards simultaneously constituted a cooperative effort to establish an industry-wide safety baseline and a competitive effort to ensure that one's own proprietary sensor configuration becomes the default. Managing this dual dynamic requires governance structures—such as standards bodies with balanced voting rights and IP licensing frameworks—that prevent any single firm from exploiting the cooperative standard-setting process for competitive gain.

5.3 Joint Infrastructure Investment

The third coopetition mechanism identified prominently in the literature is joint infrastructure investment, whereby competing transport firms co-finance shared physical or digital infrastructure that reduces costs for all participants while preserving competitive rivalry in service delivery. This mechanism is particularly prevalent in capital-intensive transport contexts where infrastructure investment costs exceed what any single firm can justify unilaterally, yet the infrastructure's value is contingent on broad adoption across competing platforms. Parker et al. (2016) provided a theoretical foundation for this mechanism in their analysis of how platform owners co-invest in enabling technologies—such as payment rails, mapping infrastructure, and real-time traffic data systems—that underpin multiple competing platform businesses.

Empirical evidence of joint infrastructure investment as a coopetition mechanism in transport is found across multiple sub-sectors in the reviewed literature. In urban air mobility (UAM), Cohen et al. (2021) documented emerging coopetitive arrangements among competing UAM operators—including Joby Aviation, Archer, and Wisk—that involved joint advocacy for and co-financing of vertiport infrastructure in pilot cities, despite intense competition for operating licences and market share. In maritime logistics, Panayides and Song (2020) found that competing container shipping lines operating within vessel-sharing agreements (VSAs) made joint investments in port terminal technology, reducing turnaround times for all participants while competing on freight rates, service frequency, and route networks. These examples illustrate that joint infrastructure investment operates as a coopetition mechanism precisely because the cooperative component—shared cost reduction—and the competitive component—service differentiation—occur in different value chain layers, consistent with Bengtsson and Kock's (2000) observation that coopetition is most stable when competitive and cooperative activities are separated by activity domain or customer interface.

The governance of joint infrastructure investments presents specific challenges not fully addressed in the general coopetition literature. Fünfschilling and Truffer (2018) highlighted the role of regulatory frameworks in enabling or constraining joint infrastructure investment among transport competitors, noting that antitrust authorities in several jurisdictions have required structural safeguards—such as non-discriminatory access provisions and transparent pricing protocols—before approving co-investment arrangements among transport platform rivals. The reviewed literature suggests that the most durable joint infrastructure investments are those underpinned by neutral governance structures, such as industry consortia or public-private joint ventures, that distribute decision rights equitably and prevent any single investor from leveraging co-investment to extract competitive advantage.

5.4 Co-Regulatory Engagement as a Coopetition Mechanism

A fourth coopetition mechanism identified across the reviewed literature—though less extensively theorised than the preceding three—is co-regulatory engagement: the practice of competing transport platform firms coordinating their engagement with regulatory authorities to shape a regulatory environment conducive to ecosystem-level value creation, while maintaining competitive rivalry in market operations. Czakon et al. (2020) identified co-regulatory engagement as an emerging coopetition mechanism in platform industries, arguing that the opacity of platform business models and the novelty of their regulatory challenges create incentives for competitors to present unified positions in regulatory forums, even as they contest market share.

In the transport context, several studies documented instances of co-regulatory coopetition. Greenblatt and Saxena (2020) examined the formation of industry coalitions among competing autonomous vehicle developers—including Waymo, Cruise, and Aurora—that jointly advocated for federal AV safety frameworks in the United States, sharing safety data and policy positions to accelerate regulatory approval while competing intensely for commercial deployment licences. Similarly, in European MaaS markets, Sochor et al. (2018) found that competing MaaS operators formed joint working groups with national transport authorities to define data governance standards, passenger rights frameworks, and intermodal liability rules—a cooperative investment in regulatory infrastructure that benefited all ecosystem participants while each operator maintained proprietary commercial strategies. Ritala

(2022) theorised this mechanism as 'regulatory coopetition,' arguing that firms in nascent digital markets face a commons dilemma: uncoordinated regulatory lobbying by competitors produces regulatory fragmentation harmful to all, while coordinated engagement generates a regulatory commons from which all benefit.

5.5 Governance Architecture and Success Factors

Across all four identified coopetition mechanisms, the reviewed literature converges on governance architecture as the primary determinant of coopetition stability and performance. Bengtsson and Raza-Ullah (2016) demonstrated that coopetition relationships lacking explicit governance structures—defined as the formal and informal rules, roles, and processes that regulate cooperative and competitive activities—are significantly more likely to dissolve or transition into pure competition due to opportunistic defection. In technology-enabled transport ecosystems, governance architecture must address three core challenges: defining the scope of collaboration, protecting competitive boundaries, and designing value appropriation rules.

The scope of collaboration defines which activities, data types, and infrastructure components are subject to cooperative arrangements and which remain in the competitive domain. The reviewed literature suggests that the most successful coopetition arrangements in transport ecosystems employ modular governance frameworks that clearly layer collaborative activities at the infrastructure or data standard level while preserving competitive freedom at the service delivery and customer interface levels (Jacobides et al., 2018; Hensher, 2020). Protecting competitive boundaries requires governance mechanisms that prevent cooperative activities from becoming channels for competitive intelligence transfer—a risk documented in data-sharing alliances, standards bodies, and joint infrastructure investments alike. Value appropriation rules—the terms on which each cooperating firm captures returns from jointly created value—are particularly critical in transport ecosystems characterised by significant size asymmetries among platforms; without equitable appropriation frameworks, larger platforms extract disproportionate returns, undermining smaller participants' incentives to sustain cooperative engagement (Ritala & Hurmelinna-Laukkanen, 2022; Czakon et al., 2020).

Trust calibration emerges as a second critical success factor across the reviewed literature. Raza-Ullah (2020) found that coopetition relationships in which partners perceive a high degree of mutual trust are better able to manage the cognitive and organisational tensions induced by simultaneous cooperation and competition. In transport platform contexts, trust is cultivated through transparent data governance, consistent adherence to agreed collaboration boundaries, and reputation effects sustained over repeated interactions. Tidström (2014) identified temporal consistency—the sustained maintenance of collaborative commitments over time—as a primary trust-building mechanism, while Czakon et al. (2020) found that third-party governance structures, such as industry associations or neutral data intermediaries, can substitute for bilateral trust in early-stage coopetition relationships.

6.0 CONCLUSION

This systematic review has synthesised 74 peer-reviewed studies published between 2018 and 2026 to identify and explain the coopetition mechanisms operative in technology-enabled transport ecosystems. The review was anchored in two theoretical frameworks—coopetition theory and platform ecosystem theory—which together provide a multi-level explanatory architecture for understanding how and why firms that are direct competitors in transport markets simultaneously engage in cooperative value creation. The central finding is that coopetition in technology-enabled transport ecosystems is not a peripheral or transitional phenomenon but a structurally embedded feature of digital platform architectures, network effect dynamics, and regulatory environments that characterise contemporary transport markets.

Four primary coopetition mechanisms were identified: data-sharing alliances, interoperability agreements, joint infrastructure investment, and co-regulatory engagement. Each mechanism operates according to a layered logic that separates cooperative activities—typically located at the infrastructure, data standard, or regulatory engagement level—from competitive activities at the service delivery and customer relationship level. This layered architecture allows participating firms to expand the total value created within the ecosystem through collaboration while retaining competitive differentiation in the layers that determine market position and revenue capture. The review demonstrates that this beyond zero-sum logic is not merely theoretically plausible but empirically documented across diverse transport sub-sectors, from urban ride-hailing and MaaS ecosystems to autonomous vehicle consortia, logistics platforms, and electric vehicle charging networks.

The governance architecture sustaining these mechanisms is as consequential as the mechanisms themselves. The reviewed literature converges on three governance imperatives: the clear delineation of collaboration scope, the active protection of competitive boundaries, and the design of equitable value appropriation rules. Where these governance elements are absent or inadequate, coopetition relationships are vulnerable to opportunistic defection, competitive intelligence leakage, and the destabilising effect of asymmetric value capture by dominant platform actors. Trust calibration and institutional support—through industry associations, regulatory sandboxes, and neutral data intermediaries—emerge as moderating conditions that enhance coopetition stability and performance outcomes.

The review also identifies limitations and gaps that should guide future research. The included literature is heavily concentrated in European and North American transport contexts, limiting the generalisability of findings to emerging-economy transport ecosystems, which present distinct regulatory, infrastructural, and competitive conditions. The mechanisms of coopetition in urban air mobility, hydrogen logistics networks, and freight platform ecosystems are underexplored and represent fertile ground for future empirical inquiry. The temporal dynamics of coopetition—how mechanisms evolve, intensify, or dissolve over ecosystem lifecycle stages—are insufficiently theorised and empirically documented. Finally, the ethical and equity implications of coopetition-driven data governance in transport ecosystems—particularly for vulnerable and underserved mobility populations—deserve dedicated scholarly attention. The paper contributes a coherent synthetic framework to a fragmented literature and establishes a foundation for both scholarly inquiry and managerial practice in an area of growing strategic importance.

7.0 RECOMMENDATIONS

1. Transport platform firms should develop explicit coopetition governance charters that define the scope of collaborative activities, establish competitive boundary protocols, and specify value appropriation rules

before entering coopetition arrangements, reducing the risk of relationship breakdown due to ambiguous role expectations.

2. Policymakers and transport regulators should establish adaptive regulatory sandboxes specifically designed for coopetitive innovation in transport ecosystems, enabling firms to test data-sharing, interoperability, and joint infrastructure arrangements without triggering premature antitrust scrutiny while monitoring for anti-competitive effects.
3. Industry associations and standards bodies in the transport sector should assume governance roles as neutral intermediaries in data-sharing alliances and standards formation processes, mitigating power asymmetries between large and small platform actors and ensuring that cooperative standards do not entrench dominant platform advantages.
4. Transport firms engaging in coopetition should invest in trust-building mechanisms—including transparent data governance dashboards, independent audit processes, and structured joint governance committees—to sustain cooperative commitments over time and reduce the cognitive and organisational tensions inherent in simultaneous competition and cooperation.
5. Future research should extend systematic investigation of coopetition mechanisms to emerging transport contexts including urban air mobility, autonomous freight networks, and hydrogen logistics ecosystems, applying comparative cross-regional methodologies to enhance the generalisability of findings beyond European and North American contexts.

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