

E-COMMERCE PLATFORM COLLABORATION AND PLATFORM-BASED SUPPLY CHAIN EFFICIENCY: A CONCEPTUAL REVIEW OF STRUCTURAL INTEGRATION AND RELATIONAL QUALITY MECHANISMS

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Abstract: *This article aims to develop a structural-relational conceptual framework explaining how e-commerce platform collaboration mechanisms translate into platform-based supply chain efficiency through supply chain integration and supply chain relationship quality. E-commerce platforms increasingly reshape supply chains as coordination infrastructures rather than merely online transaction channels. However, existing research remains fragmented in explaining how platform collaboration becomes efficiency-relevant in platform-based supply chains. Using a conceptual review and development-sequence synthesis, this article integrates literature on e-commerce platform collaboration, supply chain integration, supply chain relationship quality, and platform-based supply chain efficiency. The synthesis identifies two parallel mechanisms. Supply chain integration operates as a structural mechanism by aligning information, processes, and operations, whereas supply chain relationship quality operates as a relational mechanism by strengthening trust, commitment, and cooperative problem-solving. Based on this synthesis, the article develops a framework linking E-commerce Platform Collaboration Mechanisms, Supply Chain Integration, Supply Chain Relationship Quality, and Platform-Based Supply Chain Efficiency. The article contributes by clarifying that platform collaboration does not automatically generate*

efficiency; its efficiency relevance depends on whether platform-supported coordination becomes structurally embedded and relationally sustained.

Keywords: *E-commerce platform collaboration; Platform-based supply chain efficiency; Supply chain integration; Supply chain relationship quality; Platform-based supply chains; Conceptual review*

Introduction

E-commerce platforms have increasingly become coordination infrastructures in platform-based supply chains rather than merely online transaction channels. As digital platforms become embedded in supply chain and logistics activities, they organise interactions among platform-related actors through digital interfaces, operational routines, logistics links, service communication, and rule-based arrangements. Platformisation research indicates that digital platforms increasingly connect diverse stakeholders and facilitate new ways of managing and optimising operations and supply chains (Jia et al., 2026). In this context, E-commerce platforms are relevant not only to digital business research but also to supply chain management because they shape how actors exchange information, process transactions, fulfil orders, coordinate logistics, and respond to service requirements.

Platform-based supply chains are more complex than ordinary online selling environments because they combine digital coordination with physical execution. Orders, payments, logistics tracking, inventory responses, return handling, settlement procedures, and service recovery may be digitally mediated, but their efficiency depends on physical fulfilment and cross-actor operational execution. Supply chain digital platforms therefore differ from general-purpose digital platforms because they coordinate inter-organisational processes, manage cross-firm dependencies, and support material, information, and financial flows under time and space constraints (Kam et al., 2026). This digital-physical embeddedness suggests that platform-based supply chain efficiency depends on whether platform-supported coordination can be translated into effective operational execution.

Prior research has generated valuable insights into platformisation, digital platforms, supply chain collaboration, supply chain integration, relationship governance, logistics fulfilment, and supply chain performance. Digital platform reviews show that platforms may act as service agencies, solution incubators, mission-specific outcome shapers, and performance boosters in supply chain and logistics management (Kam et al., 2026). Theory-oriented reviews also indicate that digital platforms have transformed supply chain management tasks, while the theoretical explanation of why and how platforms influence supply chain outcomes remains fragmented (Culotta et al., 2024). Existing studies therefore provide important foundations for understanding the role of platforms in supply chain contexts, but they do not fully explain how E-commerce platform collaboration becomes efficiency-relevant through specific structural and relational mechanisms.

Despite growing attention to digital platforms and platformisation in supply chain management, the mechanism through which E-commerce platform collaboration becomes efficiency-relevant remains insufficiently specified. Prior research has developed through several related but partly separated phases, including supply chain collaboration, platformisation, platform governance, digital connectivity, relational quality, logistics

fulfilment, and operational efficiency. However, these phases are often discussed independently rather than being integrated into a coherent explanation of how platform-supported coordination is translated into platform-based efficiency outcomes. As a result, E-commerce platform collaboration is frequently treated as a general technological or governance condition rather than as a multidimensional platform-level coordination mechanism. This article addresses this gap by developing a structural-relational explanation of how E-commerce Platform Collaboration Mechanisms may be translated into Platform-Based Supply Chain Efficiency through Supply Chain Integration and Supply Chain Relationship Quality.

The central theoretical claim is that platform collaboration is not an automatic source of platform-based supply chain efficiency; its efficiency relevance depends on whether platform-supported coordination is structurally embedded and relationally sustained.

This article adopts a conceptual review approach to synthesise theoretically relevant literature and develop a mechanism-based framework. The review is organised through a development-sequence logic rather than a simple list of literature streams. E-commerce Platform Collaboration Mechanisms are conceptualised as platform-provided coordination conditions that support information sharing, transaction and settlement, order fulfilment and logistics coordination, service communication, and rule-based interaction. Supply Chain Integration is positioned as the structural mechanism through which platform-supported coordination becomes embedded in information, process, and operational alignment. Supply Chain Relationship Quality is positioned as the relational mechanism through which repeated platform-mediated coordination is sustained through trust, commitment, and cooperative problem-solving. This distinction builds on prior supply chain collaboration, integration, and relationship quality research while extending these streams into platform-mediated supply chain settings (Cao & Zhang, 2011; Fynes et al., 2005; Leuschner et al., 2013).

This article contributes to platform-based supply chain research in three interrelated ways. The development-sequence synthesis organises prior research by linking foundational coordination logic, platformisation, platform governance, digital connectivity, relational quality, logistics fulfilment, operational efficiency, and contextual extension. This synthesis clarifies how platform-based supply chain research has moved from general coordination and integration logic toward platform-mediated, multi-actor, and service-intensive supply chain explanation. The article further advances platform-based supply chain theory by shifting the explanation from platform-function determinism to mechanism-based efficiency generation. Rather than assuming that platform functions automatically improve efficiency, it argues that E-commerce platform collaboration becomes efficiency-relevant only when platform-supported coordination is structurally embedded through Supply Chain Integration and relationally sustained through Supply Chain Relationship Quality. In addition, the article contextualises supply chain efficiency in platform-mediated operations by distinguishing Platform-Based Supply Chain Efficiency from broad firm performance, financial performance, market performance, and general supply chain performance. Taken together, these contributions position platform collaboration as a coordination condition rather than as an automatic source of efficiency outcomes.

Literature Review

This article adopts a conceptual review approach because its objective is to integrate theoretically relevant research streams and develop a mechanism-based framework. Existing systematic and bibliometric reviews have mapped the development of platformisation, digital platforms, and supply chain logistics research (Jia et al., 2026; Kam et al., 2026). The present article has a different purpose. It does not aim to provide an exhaustive systematic review or a bibliometric analysis. Instead, it synthesises selected literature to explain how E-commerce platform collaboration may become efficiency-relevant through structural and relational mechanisms.

The literature was selected according to conceptual relevance rather than exhaustive database coverage. Priority was given to studies that directly contribute to the development of the article's core conceptual domains: E-commerce platform collaboration, supply chain collaboration, supply chain integration, supply chain relationship quality, platformisation in operations and supply chain management, e-commerce logistics fulfilment, and platform-based supply chain efficiency. Foundational studies were retained when they provided core construct definitions, mechanism logic, or widely recognised theoretical support for collaboration, integration, and relationship quality. More recent studies were prioritised when they reflected platform-mediated supply chain contexts, digital connectivity, platform governance, logistics service configuration, and data-intensive coordination. This selection logic is consistent with the article's theory-development purpose because the aim is to reconstruct conceptual development and build an integrative framework rather than to report a complete systematic search protocol.

To improve review transparency, a brief conceptual review protocol was applied. Literature was searched through major academic databases and publisher platforms, including Scopus, Web of Science, ScienceDirect, Emerald Insight, Taylor & Francis Online, SpringerLink, and Google Scholar. Search terms included combinations of “e-commerce platform”, “digital platform”, “platform-based supply chain”, “supply chain collaboration”, “supply chain integration”, “supply chain relationship quality”, “platform governance”, “e-commerce logistics”, “fulfilment”, and “supply chain efficiency”. The main time boundary for recent platform-related literature was 2021–2026, while earlier foundational studies were retained when they provided core construct definitions, mechanism logic, or theoretical support for collaboration, integration, and relationship quality. The screening process focused on conceptual relevance to the four main domains of this article: E-commerce Platform Collaboration Mechanisms, Supply Chain Integration, Supply Chain Relationship Quality, and Platform-Based Supply Chain Efficiency. The final synthesis retained studies that directly contributed to construct definition, mechanism development, framework building, or future research agenda development.

To organise the conceptual synthesis, the review follows a development-sequence logic. Rather than presenting prior studies as a simple list of fragmented literature streams, this article traces how supply chain coordination research has evolved from foundational collaboration and integration logic toward platform-based coordination, platform governance, digital connectivity, relational quality, logistics fulfilment, operational efficiency, and future platform-enabled supply chain contexts. This development sequence is useful because it links research evolution with practical changes in E-commerce platform supply chains. It also

clarifies why a structural-relational framework is needed to explain platform-based supply chain efficiency.

The literature reviewed in this article is grouped into eight development phases: foundational coordination logic; platformisation of supply chain management, where digital platforms increasingly function as coordination infrastructures; platform governance and rule-based coordination; digital connectivity and structural integration; relational quality and relationship capital in repeated platform-mediated coordination; logistics fulfilment and service configuration; operational efficiency and performance measurement; and contextual extensions that indicate future research opportunities.

Table 1 summarises the development sequence of platform-based supply chain coordination research. The table does not aim to include every study in the field. Instead, it identifies representative studies across major phases of development and clarifies how each phase supports the article's conceptual framework.

Table 1. Theory-Development Sequence of Platform-Based Supply Chain Coordination Research

Phase	Time Period	Theoretical Development Logic	Representative Studies and Role in This Review
Foundational coordination logic	Before 2015	Established collaboration, integration, relationship quality, and information alignment as core explanations of cross-firm coordination and performance.	Cao et al. (2010); Cao and Zhang (2011); Flynn et al. (2010); Fynes et al. (2005); Leuschner et al. (2013).
Platformisation of OSCM and SCLM	2022-2026	Reframed platforms as coordination infrastructures that connect actors, data, workflows, logistics, service routines, and performance outcomes.	Al Mashalah et al. (2022); Culotta et al. (2024); Jia et al. (2026); Kam et al. (2026); Wunderlich et al. (2025).
Platform governance and rule-based coordination	2023-2025	Shifted attention from platform access to rules, service standards, affordances, governance mechanisms, and actor behaviour under platform conditions.	Chen, Chan, and Cai (2023); Li et al. (2024); Li and Li (2023).
Digital connectivity and structural embedding	2022-2025	Explained why digital visibility and system connectivity must become information, process, and operational alignment to affect efficiency.	He et al. (2022); Kalesh et al. (2024); Zha et al. (2022); Zhang et al. (2024).
Relational quality and	2005; 2022-2025	Clarified that platform-mediated coordination still depends on trust, commitment,	Fynes et al. (2005); Can Saglam et al. (2022); Chen, Chan, and Cai (2023).

Phase	Time Period	Theoretical Development Logic	Representative Studies and Role in This Review
relationship capital		reciprocity, relationship capital, and cooperative problem-solving.	
Fulfilment, logistics, and service configuration	2021-2025	Located platform-based efficiency in fulfilment, delivery, logistics-service choice, returns, marketplace services, and service configuration.	Cao et al. (2021); He et al. (2022); Zheng et al. (2022); Li and Li (2023); Li et al. (2025); T. Chen et al. (2025).
Operational efficiency and platform performance	2023-2025	Narrowed efficiency from broad performance to timely, coordinated, resource-efficient, and service-consistent platform-mediated operations.	Deshpande and Pendem (2023); R. Chen et al. (2025); Gong et al. (2024).
Contextual extension and future development	2021-2026	Extended the framework toward cross-border platforms, livestream commerce, logistics sharing, green logistics, sustainability, and data-intensive coordination.	Wang et al. (2021); Cui et al. (2023); Hua and Wu (2024); Khooban et al. (2025); Qin et al. (2025).

Note. The table maps representative studies according to their theoretical role in the development of the present framework. It is used for theory-development synthesis rather than as a systematic review protocol.

E-commerce Platforms as Supply Chain Coordination Infrastructures

Building on the development sequence presented in Table 1, this section conceptualises E-commerce platforms as supply chain coordination infrastructures. The development of platform-based supply chain research indicates that E-commerce platforms have moved beyond their original role as online transaction interfaces. In platform-based supply chains, platforms do not simply match buyers and sellers; they structure how actors exchange information, complete transactions, coordinate fulfilment, communicate about service issues, and comply with platform rules. Their role is infrastructural because they shape the conditions under which repeated supply chain activities are organised. Platformisation literature suggests that platforms increasingly connect actors, data flows, operational processes, and ecosystem participation across organisational boundaries (Jia et al., 2026).

This coordination role is important because platform-based supply chains combine digital coordination with physical execution. Orders, payments, logistics tracking, inventory responses, return handling, settlement procedures, and service recovery may be digitally mediated, but their efficiency depends on cross-actor execution. Supply chain digital platforms differ from general-purpose digital platforms because they are embedded in both digital and physical spaces and coordinate inter-organisational processes, cross-firm dependencies, and material, information, and financial flows (Kam et al., 2026). This digital-physical embeddedness makes platform-based supply chains more complex than isolated online selling.

E-commerce platform supply chains also involve multiple actors whose activities are interdependent rather than isolated. These actors may include sellers, logistics service providers, payment-related actors, service partners, platform operators, and rule-based interface systems. Their actions are connected through platform routines such as order processing, logistics assignment, fulfilment tracking, after-sale communication, dispute resolution, and rule enforcement. A coordination failure in one activity can affect other activities, producing delays, inconsistent service, inefficient resource use, or weakened operational responsiveness. This interdependence explains why platform-based supply chains require both structural and relational forms of coordination.

Platform-based supply chains therefore require more than access to an E-commerce platform. They require platform-supported mechanisms that structure repeated coordination across information exchange, transaction linkage, fulfilment execution, logistics response, service communication, and rule-based operational compliance. Treating E-commerce platforms merely as online marketplaces would understate their role in shaping supply chain coordination. Platform access is insufficient; what matters is whether platform arrangements support repeated supply chain coordination. E-commerce Platform Collaboration Mechanisms capture this coordination role by focusing on how platform-level arrangements support collaborative supply chain activities.

E-commerce Platform Collaboration Mechanisms

E-commerce Platform Collaboration Mechanisms refer to platform-provided coordination conditions that enable, structure, and support repeated interaction among platform-related supply chain actors. They should not be equated with the mere adoption of an E-commerce platform or with general digitalisation. Rather, they capture the platform arrangements through which information sharing, transaction and settlement, fulfilment and logistics, service communication, and rule-based interaction are organised. This conceptualisation extends supply chain collaboration research, which has treated collaboration as a multidimensional inter-organisational construct involving information sharing, joint coordination, resource alignment, and relationally embedded collaborative routines (Cao et al., 2010; Cao & Zhang, 2011). This distinction is important because E-commerce Platform Collaboration Mechanisms represent platform-level coordination conditions, whereas Supply Chain Integration and Supply Chain Relationship Quality explain whether these conditions become structurally embedded and relationally sustained.

Information sharing support refers to the extent to which an E-commerce platform provides timely, accurate, visible, and operationally useful information for platform-based supply chain activities. Such information may include order status, inventory signals, logistics updates, demand-related data, service records, return information, and other information required for coordinated execution. In platform-based supply chains, information enables actors to interpret shared operational conditions and adjust their activities accordingly. When platform information is timely and usable, actors are better able to reduce uncertainty, avoid duplicated responses, and coordinate fulfilment and service activities. Information sharing support may therefore contribute to information alignment and may also increase transparency in repeated platform-mediated interactions.

Transaction and settlement support refers to platform functions that structure transaction confirmation, payment processing, settlement routines, transaction documentation, and exchange traceability. In E-commerce platform contexts, transactions are embedded in broader supply chain routines involving order confirmation, payment security, refund handling, financial reconciliation, and settlement continuity. Reliable transaction and settlement support reduces ambiguity in exchange processes and lowers the risk of disputes among platform-related actors. It also standardises the procedural basis through which actors complete repeated transactions under shared platform conditions. From a structural perspective, this dimension may support process alignment; from a relational perspective, it may strengthen trust by reducing uncertainty surrounding payment, settlement, and exchange accountability.

Order fulfilment and logistics coordination refers to platform-supported arrangements for processing, dispatching, tracking, delivering, and recovering orders across platform-mediated supply chain operations. This dimension is central because E-commerce platform activities are digitally initiated but physically executed through fulfilment, warehousing, transport, delivery, return, and service recovery processes. Platform-supported fulfilment and logistics coordination connects online order information with offline operational execution. It can clarify order status, logistics responsibility, delivery progress, exception handling, and return-related procedures. Research on E-commerce platform service supply chains also suggests that logistics integration and platform service arrangements can reshape operational outcomes (Cao et al., 2021; T. Chen et al., 2025; He et al., 2022; Zheng et al., 2022). This dimension is closely related to operational alignment and has direct relevance to timeliness, resource use, service consistency, and responsiveness to disruptions.

Service communication support refers to platform-enabled communication mechanisms for pre-sale interaction, fulfilment updates, after-sale service, dispute response, complaint handling, return and refund communication, and service recovery. In platform-based supply chains, service communication is part of the operational infrastructure through which actors detect problems, clarify responsibilities, and coordinate responses. Effective communication can prevent minor operational issues from becoming larger coordination failures. It allows platform-related actors to exchange service-related information during routine transactions and exceptional events. This dimension may support relationship quality by strengthening trust, commitment, and cooperative problem-solving, and it may also improve service consistency.

Platform rules and terms support refers to the rule-based arrangements through which E-commerce platforms guide, constrain, and standardise actor behaviour. These arrangements may include rating systems, dispute rules, fulfilment requirements, delivery standards, refund rules, penalty mechanisms, service standards, data requirements, and compliance procedures. Platform rules can reduce ambiguity by clarifying expected behaviours, responsibilities, and consequences. At the same time, they may create adaptation pressure, dependence, and negotiation challenges. Platform governance mechanisms can shape exchange conditions, coordination routines, and seller-firm outcomes in B2B e-commerce settings (Li et al., 2024). These platform-level arrangements are also connected to marketplace service strategies, where platform rules, service structures, and logistics arrangements may shape seller behaviour and operational outcomes (Li & Li, 2023). For this reason, platform rules and terms support should be understood as both a structural and relational coordination condition.

Although platform rules and terms may reduce coordination ambiguity and standardise operational responsibilities, they should not be treated as purely neutral coordination devices. Platform governance may also generate dependence, adaptation pressure, asymmetric control, and compliance burdens for platform-related supply chain actors. This dual role is important because the same rule-based mechanisms that support coordination may also constrain actor autonomy or redistribute operational risks across the platform-based supply chain. Therefore, E-commerce Platform Collaboration Mechanisms should be understood as coordination-enabling conditions whose efficiency relevance depends on how platform governance is interpreted, adopted, and enacted by supply chain actors.

Supply Chain Integration as a Structural Mechanism

Supply Chain Integration represents the structural mechanism through which platform-provided coordination conditions become embedded in platform-based supply chain routines. Foundational research has shown that supply chain integration concerns cross-boundary alignment among supply chain processes, while meta-analytic evidence links integration to performance-related outcomes (Flynn et al., 2010; Leuschner et al., 2013). In this article, Supply Chain Integration is reflected in information alignment, process alignment, and operational alignment. These forms of alignment are necessary because platform functions do not generate efficiency simply by existing. Information, transaction, fulfilment, service, and rule-based arrangements become efficiency-relevant only when they are translated into coordinated routines across platform-related actors. E-commerce Platform Collaboration Mechanisms refer to platform-provided coordination conditions, whereas Supply Chain Integration refers to the achieved alignment of information, processes, and operations across platform-related supply chain actors. Recent research on supplier connectivity and digital supply chain system integration further indicates that digital integration depends not only on system availability but also on supplier acceptance, connectivity, and cross-actor implementation conditions (Kalesh et al., 2024).

Information alignment refers to the extent to which platform-related supply chain actors maintain consistent, accessible, and mutually usable information in platform-mediated operations. Platform-supported information visibility provides the basis for such alignment by improving access to order information, logistics updates, inventory signals, transaction records, service information, and return-related data. When actors operate with consistent and timely information, coordination decisions become less ambiguous and more responsive. Information alignment can reduce mismatch, repeated verification, delayed response, and duplicated operational effort. It therefore connects platform-supported visibility with coordinated supply chain execution.

Process alignment refers to the coordination of procedures, routines, and responsibilities across platform-mediated supply chain activities. In E-commerce platform contexts, key processes include order processing, transaction confirmation, payment and settlement linkage, fulfilment arrangement, return handling, service recovery, and rule-based compliance. Standardised platform routines can make these cross-actor processes more traceable and predictable. When processes are aligned, actors are more likely to understand what should be done, when it should be done, and which party is responsible for each operational step. Process alignment therefore reduces procedural discontinuity and supports resource-efficient and service-consistent operations.

Operational alignment refers to the synchronisation of logistics, fulfilment, inventory response, service execution, and exception-handling activities. This dimension is where platform-supported collaboration becomes visible in actual supply chain performance. Fulfilment and logistics coordination translate digital platform arrangements into operational execution by connecting platform orders with delivery response, return procedures, and service recovery. When operational activities are aligned, platform-related actors can respond more effectively to demand fluctuations, delivery delays, inventory issues, settlement problems, and service exceptions. Supply Chain Integration therefore explains how platform-provided coordination conditions become structurally embedded in platform-based supply chain routines.

Supply Chain Relationship Quality as a Relational Mechanism

Supply Chain Relationship Quality represents the relational mechanism through which repeated platform-mediated coordination is sustained. Whereas Supply Chain Integration explains structural alignment, Supply Chain Relationship Quality explains relational willingness and cooperative continuity. Prior relationship quality research suggests that inter-organisational supply chain relationships depend on relational conditions such as trust, commitment, communication, adaptation, and cooperative behaviour (Fynes et al., 2005). More recent platform-based supply chain research also suggests that platform affordances may contribute to supply chain relationship capital by enabling value co-creation, relationship building, and strategic learning (Chen et al., 2023). This distinction is conceptually important because platform-based supply chains are not purely technical or procedural systems. Even when platform functions provide information visibility, transaction traceability, fulfilment coordination, service communication channels, and rule-based procedures, coordination may still fail if actors do not trust one another, remain weakly committed, or avoid cooperative problem-solving. In this article, Supply Chain Relationship Quality is conceptualised through trust, commitment, and cooperative problem-solving.

Trust refers to the expectation that platform-related supply chain actors will behave reliably, transparently, and fairly during repeated coordination. In platform-mediated operations, trust is closely connected to whether actors believe that information, settlement routines, fulfilment arrangements, service responses, and rule enforcement are dependable. E-commerce Platform Collaboration Mechanisms may support trust by improving information visibility, settlement reliability, fulfilment traceability, service communication, and rule predictability. Trust reduces relational uncertainty and lowers the need for excessive monitoring, repeated verification, and defensive coordination. It therefore provides a relational basis through which platform-supported coordination may become more stable and efficient.

Commitment refers to actors' willingness to maintain and invest in platform-mediated supply chain relationships over time. In repeated E-commerce platform operations, commitment should not be understood as emotional attachment alone. Rather, it reflects the willingness of platform-related actors to adapt to shared routines, maintain cooperative expectations, and continue coordination under platform rules and operational uncertainty. Recent relational supply chain research further shows that communication quality and relational commitment are important for sustaining cooperation under uncertainty (Can Saglam et al., 2022). Platform routines may support commitment when they provide stable transaction expectations, reliable settlement procedures, predictable fulfilment arrangements, and clearer service

responsibilities. Commitment can reduce switching-related disruption, improve coordination continuity, and support more consistent supply chain execution.

Cooperative problem-solving refers to actors' willingness and ability to jointly address operational exceptions in platform-mediated supply chains. Such exceptions may involve delivery delays, order errors, logistics disruptions, inventory mismatches, return and refund disputes, settlement inconsistencies, service failures, or rule-related conflicts. E-commerce Platform Collaboration Mechanisms may provide communication channels, transaction records, logistics visibility, service procedures, and rule-based response mechanisms, but the existence of these functions does not guarantee effective problem resolution. Many platform-based operational problems require mutual adjustment, shared evidence interpretation, and cooperative response. Cooperative problem-solving therefore represents the relational process through which actors manage disruptions and restore coordination.

Platform-Based Supply Chain Efficiency

Platform-Based Supply Chain Efficiency captures the efficiency of platform-mediated supply chain operations rather than broad firm, financial, market, or general supply chain performance. This boundary is necessary because E-commerce platform operations are shaped by the interaction between digital interfaces and physical supply chain execution. Digital platform research in supply chain and logistics management positions platforms as potential performance boosters, while also suggesting that performance effects depend on how digital and operational resources are integrated (Kam et al., 2026). Empirical work on E-commerce platforms also shows that logistics performance and logistics ratings are closely connected to customer purchasing behaviour and seller sales, indicating that logistics execution is a central operational efficiency issue in platform-mediated environments (Deshpande & Pendem, 2023). Platform-mediated operations involve order processing, fulfilment coordination, logistics response, settlement continuity, return and refund handling, service recovery, and rule-based operational adjustment. Therefore, Platform-Based Supply Chain Efficiency should not be evaluated only through sales growth, profitability, customer satisfaction, or overall firm performance. It focuses on whether platform-related supply chain activities are carried out in a timely, coordinated, resource-efficient, and service-consistent manner.

In platform-based e-commerce supply chains, reverse flows such as returns, refunds, complaint handling, and service recovery should not be treated as peripheral activities. They are central to platform-based supply chain efficiency because they affect coordination continuity, resource use, settlement stability, and service consistency. A platform-based supply chain may appear efficient during forward order fulfilment, but its overall efficiency can be weakened when return handling, refund processing, dispute response, or service recovery is delayed, fragmented, or poorly coordinated. Therefore, PB-SCE should capture not only the efficiency of forward fulfilment but also the ability of platform-related actors to maintain coordinated and resource-efficient responses during reverse-flow and exception-handling processes. This distinction further differentiates PB-SCE from conventional logistics efficiency because platform-based supply chain efficiency depends on the coordinated management of both forward fulfilment and reverse-flow recovery.

Platform-Based Supply Chain Efficiency can be understood through four operational manifestations. Timeliness refers to the ability of platform-related actors to process orders,

fulfilment tasks, logistics responses, settlement-related activities, and service issues without unnecessary delay. Coordination refers to the consistency of actions among actors involved in fulfilment, logistics, settlement, return handling, and service recovery. Resource efficiency refers to the reduction of redundant effort, repeated adjustment, operational waste, and inefficient resource use. Service consistency refers to the ability to maintain stable fulfilment and service responses during routine transactions as well as high-pressure or exception-based platform conditions. Recent research on logistics service selection and platform logistics strategy further supports the view that platform-based efficiency is shaped by delivery performance, logistics service integration, and the choice between platform and third-party service arrangements (Cao et al., 2021; T. Chen et al., 2025; Li et al., 2025; Li & Li, 2023; Zheng et al., 2022). Together, these manifestations reflect the operational logic of platform-based supply chains.

Platform-Based Supply Chain Efficiency is unlikely to result from platform collaboration alone. Although E-commerce Platform Collaboration Mechanisms may provide coordination conditions, these conditions must be translated into actual supply chain routines. Supply Chain Integration explains how platform-supported coordination becomes structurally embedded through information alignment, process alignment, and operational alignment. Supply Chain Relationship Quality explains why platform-related actors remain willing to cooperate, adapt, and solve problems during repeated interactions. These two mechanisms are complementary because platform-based efficiency requires both coordinated routines and cooperative continuity. Platform-Based Supply Chain Efficiency is therefore more likely when platform-supported coordination is structurally aligned through Supply Chain Integration and relationally sustained through Supply Chain Relationship Quality.

Conceptual Framework and Propositions

Because this article is conceptual rather than empirical, the propositions developed in this section are not statistically tested in the present study. They are derived from the development-sequence synthesis and are intended to guide future empirical examination of platform-based supply chain efficiency. The propositions should therefore be understood as theory-development statements rather than as empirically validated hypotheses.

Based on the development-sequence synthesis presented in Table 1, this article develops a structural-relational framework linking E-commerce Platform Collaboration Mechanisms to Platform-Based Supply Chain Efficiency through Supply Chain Integration and Supply Chain Relationship Quality. The framework integrates structural and relational lines of development in platform-based supply chain research. The structural line concerns information sharing, process alignment, digital connectivity, logistics coordination, and operational integration. The relational line concerns trust, commitment, communication quality, relationship capital, and cooperative problem-solving. Together, these two lines of development explain why platform collaboration cannot be treated as an automatic driver of efficiency.

Figure 1 presents the proposed structural-relational framework. E-commerce Platform Collaboration Mechanisms are positioned as platform-level coordination conditions. Supply Chain Integration is positioned as the structural mechanism through which these conditions become embedded in information, process, and operational alignment. Supply Chain Relationship Quality is positioned as the relational mechanism through which repeated

platform-mediated coordination is sustained through trust, commitment, and cooperative problem-solving. Platform-Based Supply Chain Efficiency is positioned as the outcome of timely, coordinated, resource-efficient, and service-consistent platform-mediated supply chain operations. The framework therefore positions Supply Chain Integration and Supply Chain Relationship Quality as parallel mechanisms rather than as sequential mechanisms.

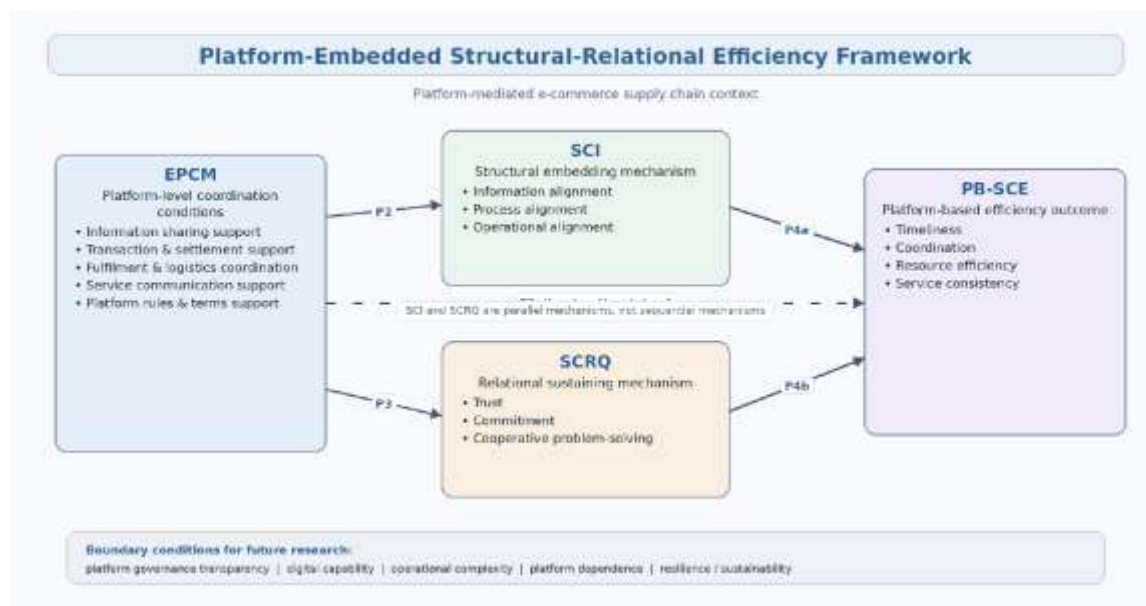


Figure 1. Platform-Embedded Structural-Relational Efficiency Framework

Note. EPCM = E-commerce Platform Collaboration Mechanisms; SCI = Supply Chain Integration; SCRQ = Supply Chain Relationship Quality; PB-SCE = Platform-Based Supply Chain Efficiency. P1 represents the retained direct path; P2-P4 represent the structural and relational mechanism paths. SCI and SCRQ are parallel mechanisms rather than sequential mechanisms.

E-commerce Platform Collaboration Mechanisms may enhance Platform-Based Supply Chain Efficiency by improving platform-supported coordination conditions. Information sharing support can improve operational visibility, transaction and settlement support can reduce exchange ambiguity, and fulfilment and logistics coordination can connect digital platform orders with physical execution. Service communication support can facilitate issue clarification and service recovery, while platform rules and terms support can standardise expected behaviours and operational responsibilities. These mechanisms may reduce operational friction and improve the timeliness, coordination, resource efficiency, and service consistency of platform-mediated supply chain operations. However, this relationship should not be understood as automatic because platform functions must still be interpreted, adopted, and embedded in actual supply chain routines.

Proposition 1: E-commerce platform collaboration mechanisms may enhance platform-based supply chain efficiency by improving platform-supported coordination conditions.

E-commerce Platform Collaboration Mechanisms may strengthen Supply Chain Integration by improving the structural alignment of supply chain activities across platform-related actors. Information sharing support provides the basis for information alignment by making order status, logistics updates, service information, and return-related data more visible and usable. Transaction and settlement support, service communication support, and platform rules can

contribute to process alignment by making platform-mediated routines more traceable, standardised, and predictable. Order fulfilment and logistics coordination can contribute to operational alignment by linking digital order flows with fulfilment execution, delivery response, exception handling, and service recovery. This logic is consistent with integration research suggesting that supply chain integration links cross-boundary alignment with performance-relevant outcomes (Flynn et al., 2010; Leuschner et al., 2013).

Proposition 2: E-commerce platform collaboration mechanisms may strengthen supply chain integration by improving information alignment, process alignment, and operational alignment across platform-related supply chain actors.

E-commerce Platform Collaboration Mechanisms may also strengthen Supply Chain Relationship Quality by improving the relational conditions of platform-mediated coordination. Information visibility, settlement reliability, fulfilment traceability, communication channels, and predictable rules can reduce relational uncertainty among platform-related actors. These mechanisms may support trust by making platform-mediated interactions more transparent and dependable. They may support commitment by creating stable expectations for repeated coordination under platform rules and operational routines. In addition, service communication tools, transaction records, logistics visibility, dispute procedures, and rule-based response mechanisms may support cooperative problem-solving when operational exceptions occur. This proposition is consistent with relationship quality and relational supply chain research that emphasises trust, commitment, communication, and cooperative behaviour (Can Saglam et al., 2022; Fynes et al., 2005). This relational logic is also consistent with platform affordance research, which suggests that digital platforms can enable relationship building and strategic learning in supply chain co-development contexts (Chen et al., 2023).

Proposition 3: E-commerce platform collaboration mechanisms may strengthen supply chain relationship quality by supporting trust, commitment, and cooperative problem-solving in repeated platform-mediated interactions.

Supply Chain Integration and Supply Chain Relationship Quality should be understood as parallel mechanisms rather than as a sequential pathway. Supply Chain Integration explains the structural embedding of platform-supported coordination, whereas Supply Chain Relationship Quality explains its relational sustaining conditions. The former concerns whether information, processes, and operations are aligned across platform-related supply chain actors; the latter concerns whether these actors remain willing to trust, commit, adapt, and solve problems in repeated interactions. Platform-Based Supply Chain Efficiency is more likely when both conditions are present because platform-mediated operations require coordinated routines as well as cooperative continuity. This argument clarifies why platform collaboration should not be treated as a simple direct efficiency driver.

Proposition 4: Supply chain integration and supply chain relationship quality may serve as parallel mechanisms through which E-commerce platform collaboration mechanisms are translated into platform-based supply chain efficiency.

Future Research Agenda

The development sequence presented in Table 1 indicates that platform-based supply chain coordination research is moving from general platformisation and logistics fulfilment toward more complex contexts involving cross-border e-commerce, livestream commerce, platform governance, digital connectivity, service configuration, sustainability-oriented logistics, and data-intensive coordination. Future research should therefore extend the structural-relational framework across different platform contexts and examine how the relative importance of Supply Chain Integration and Supply Chain Relationship Quality may vary under different operational and institutional conditions.

Future research should empirically validate the proposed structural-relational framework. The propositions developed in this article provide a basis for examining whether E-commerce Platform Collaboration Mechanisms are associated with Platform-Based Supply Chain Efficiency directly and indirectly through Supply Chain Integration and Supply Chain Relationship Quality. Survey-based structural equation modelling may be used to test these relationships, while case studies may explain how platform-supported coordination is translated into structural alignment and relational quality in specific contexts. Longitudinal designs would be particularly valuable because they can examine whether platform collaboration generates stable efficiency outcomes over time rather than only short-term coordination improvements. This direction is consistent with recent digital platform reviews calling for stronger empirical validation, contextual extension, and long-term examination of platform effects in supply chain and logistics management (Kam et al., 2026).

Future studies may extend the framework across different platform types, industries, countries, firm sizes, and governance conditions. Different e-commerce platforms may provide different levels of information visibility, logistics coordination, settlement support, service communication, and rule-based control. SMEs and larger firms may also differ in platform dependence, digital capability, bargaining power, and coordination capacity. Cross-industry research could examine whether the framework operates differently in retail, food delivery, manufacturing-related e-commerce, cross-border e-commerce, livestream commerce, and platform-based service supply chains. Future studies may also compare different logistics service configurations, including platform-provided logistics, third-party logistics, integrated logistics services, and hybrid service arrangements (Cao et al., 2021; T. Chen et al., 2025; Li & Li, 2023; Zheng et al., 2022). Cross-country research could further examine whether institutional environments and platform governance regimes influence how E-commerce Platform Collaboration Mechanisms are translated into Supply Chain Integration, Supply Chain Relationship Quality, and Platform-Based Supply Chain Efficiency.

Future research may also combine perceptual data with platform-generated operational data. Relevant data sources may include order processing records, logistics tracking information, inventory movement data, settlement records, return and refund records, service recovery data, dispute records, and platform rule enforcement information. These data can improve the objectivity of Platform-Based Supply Chain Efficiency measurement and reduce reliance on single-source responses. Platform-generated data on delivery time, logistics ratings, service recovery, fulfilment stability, and selling outcomes can further improve the measurement of platform-based supply chain efficiency (Deshpande & Pendem, 2023). Multi-source data may also help researchers examine whether Supply Chain Integration and Supply Chain

Relationship Quality operate differently during routine transactions and exceptional events. This direction is aligned with platformisation research that encourages the use of alternative data sources and digital trace data to deepen understanding of platform-based operations and supply chains (Jia et al., 2026).

Future research should examine the conditions under which structural and relational mechanisms strengthen or weaken the efficiency relevance of E-commerce Platform Collaboration Mechanisms. Potential boundary conditions include environmental uncertainty, platform governance intensity, digital capability, platform dependence, relationship history, and operational complexity. Supply Chain Integration may be more important when operational tasks are complex, time-sensitive, or highly interdependent, whereas Supply Chain Relationship Quality may be more important when service exceptions, disputes, return problems, or rule-related conflicts are frequent. Future work may also examine how supplier acceptance and digital connectivity shape the translation of platform-provided coordination conditions into structural integration (Kalesh et al., 2024). Future studies may further examine whether the two mechanisms reinforce each other under certain conditions while remaining conceptually distinct. Such theoretical refinement would move platform-based supply chain research beyond direct-effect logic and toward a more precise understanding of when and how platform collaboration becomes efficiency-relevant.

Future research should also examine the critical boundary conditions of platform governance. Platform rules, rating systems, dispute procedures, logistics standards, and service requirements may improve coordination by reducing ambiguity and standardising actor behaviour. However, they may also produce platform dependence, rule-adaptation pressure, asymmetric control, and uneven risk allocation. Future studies should therefore investigate when platform governance supports structural integration and relationship quality, and when it constrains supply chain actors or weakens relational trust. This direction would extend the structural-relational framework by recognising that platform-based supply chain efficiency is shaped not only by coordination support but also by governance power and actor dependence.

Limitations

Several limitations should be acknowledged. As a conceptual review, this article is designed to develop an integrative framework rather than to provide an exhaustive systematic review or bibliometric mapping of the field. The literature selection is guided by conceptual relevance and theory-development value, which supports mechanism-based framework building but also limits claims of comprehensive coverage. The proposed structural-relational framework remains conceptual and requires empirical validation in future research. Further studies may test the proposed relationships through survey-based structural equation modelling, comparative case studies, longitudinal research designs, or platform-generated operational data. The framework is also developed at a general platform-based supply chain level, and its applicability may vary across platform types, industries, firm sizes, national contexts, logistics configurations, and platform governance regimes. These boundaries do not weaken the conceptual contribution of the article; rather, they clarify the conditions under which future research can refine and validate the framework.

Conclusion

This article developed a conceptual framework linking E-commerce Platform Collaboration Mechanisms, Supply Chain Integration, Supply Chain Relationship Quality, and Platform-Based Supply Chain Efficiency. By organising prior research through a development-sequence synthesis, the article shows how platform-based supply chain coordination research has evolved from foundational collaboration and integration logic toward platformisation, platform governance, digital connectivity, relational quality, logistics fulfilment, operational efficiency, and contextual extension. Building on this synthesis, the article proposed a structural-relational framework in which Supply Chain Integration captures the structural pathway through which platform-supported collaboration is translated into information alignment, process alignment, and operational alignment, while Supply Chain Relationship Quality captures the relational pathway through which repeated platform-mediated coordination is sustained through trust, commitment, and cooperative problem-solving. The framework therefore shifts the explanation of platform-based supply chain efficiency from platform-function determinism toward mechanism-based efficiency generation.

The article contributes to platform-based supply chain research by integrating fragmented literature on E-commerce platform collaboration, supply chain integration, supply chain relationship quality, and platform-based supply chain efficiency. It advances a structural-relational explanation of platform collaboration by showing that E-commerce Platform Collaboration Mechanisms become efficiency-relevant only when platform-supported coordination is structurally embedded through Supply Chain Integration and relationally sustained through Supply Chain Relationship Quality. It also contextualises supply chain efficiency within platform-mediated operations by distinguishing Platform-Based Supply Chain Efficiency from broad firm performance, financial performance, market performance, and general supply chain performance. For practice, the framework suggests that platform operators and supply chain actors should strengthen cross-actor alignment, trust, commitment, and cooperative problem-solving rather than focusing only on digital functions or platform access. Overall, the article clarifies that platform collaboration is a coordination condition, whereas platform-based supply chain efficiency is a mechanism-generated outcome.

Ethical Considerations and Data Statement

This article is a conceptual review based on previously published academic literature and publicly available scholarly sources. It does not involve direct interaction with human participants, survey respondents, interviewees, experimental subjects, interventions, private personal records, or confidential organisational data. Because the article does not collect primary human-subject data or analyse identifiable private information, formal human-subjects ethics approval was not required for the review-based procedures reported in this paper.

The authors followed standard principles of research integrity by using published sources for academic purposes, representing prior studies accurately, and providing appropriate citations for the literature reviewed. No new empirical dataset was generated or analysed for this article. The conceptual synthesis was developed from the cited literature, and all sources used in the review are listed in the reference section. Therefore, data availability is not applicable to this conceptual review.

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