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Scalable Event-Driven Architectures for Enterprise Supply Chain & Logistics

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Abstract

Scalable event-driven architectures are now the focus of enterprise supply chain and logistics research as this information is surfaced from transport assets, warehouses, suppliers, platforms and risk environments at a more frequent rate to allow for faster decision making. This review looks at the concepts of peer-reviewed studies of 2015–2025 that have focused on architectures that have the ability to transform distributed events into traceability, resilience, visibility, and automated coordination. The review of the literature shows that there is no single concept but rather scattered concepts in the domain of scalable event-driven logistics within the fields of Internet of Things (IoT) in logistics, Logistics 4.0, big data analytics, blockchain traceability, multi-agent control and digital supply chain twins. These streams have significant challenges around event capture, real time analytics, decentralized provenance, and disruption response. Key gaps remain in latency benchmarking, cross-enterprise semantic interoperability, governance of shared event streams, and validated architecture-level performance evidence. The field is significant due to the increased reliance on enterprise architectures that extend beyond the organizational boundary that are also responsive, auditable and resilient.

Keywords: *Blockchain traceability; digital supply chain twins; event-driven architecture; Logistics 4.0; real-time visibility; supply chain analytics.*

1. Introduction

Enterprise supply chain and logistics systems include more and more operational events, such as inventory movements, transport milestones, temperature excursions, production-status changes, disruption alerts, customs events and warehouse execution signals. The questions that are being asked today are not whether it is possible to digitise companies' logistics records, but whether enterprise systems can be scaled to become more event-driven. Therefore, enterprise supply chain and logistics are event-driven systems, which have large-scale technical and organizational capabilities to receive, route, process, manage and react to distributed events in multi-tiered networks with the acceptable sensitivity, reliability and semantic consistency. Digital technologies are integrated with logistics execution rather than just specific elements of enterprise software products – to become competitive. It is the research of Industry 4.0 which gives rise to the topic and redefines the logistics problem as a cyber-physical coordination problem. This technology includes sensors, autonomous material handling devices, enterprise platforms and analytics engines, and can give visibility and opportunity to adjust logistics operations much more often than during periodic planning. Logistics is identified as one of the most promising fields of application of Industry 4.0 and is an area where physical flows are required to be coordinated with digital flows of machines, products, planning systems and external parties [2]. This isn't simply a software pattern. It's also an operational design principle that helps to manage temporal coupling, exception escalation, resource reallocation, end-to-end visibility. The most obvious technological argument for such an architectural shift is that of using IoT tools to manage the supply chain. Ben-Daya et al. [3] show how the studies of IoT combine identification, sensing, communication and analytics to give visibility and responsiveness in the supply chain; although they also outline some unaddressed challenges in IoT, namely, integration, privacy and data quality. This is crucial since it is not all about sending signals in logistics. These signals must be normalized as events, routed through publish–subscribe mechanisms, analysed in streaming environments, and orchestrated into downstream decisions orchestrated for warehouse management systems, transport management systems, enterprise resource planning platforms and partner applications. Logistics 4.0 scholarship extends beyond a narrow view of logistics. Winkelhaus and Grosse call Logistics 4.0 a "transformation towards connected, self-organized logistics" based on real-time information, autonomous decision support and cyber-physical integration [4]. Much of this literature, however, assesses digital technology and not scalability at the architecture level. Thus, there is a lack of integration of findings in the areas of IoT, blockchain, big data analytics, digital twins and resilience modelling. The objective of this review is to show that there is a disorganized literature from the point of view of "scalable event driven" architectures for enterprise supply chain and logistics. The article compares methodologies, results and unclosed issues, rather than generic statements about "Digital transformation" focusing on architectural mechanisms.

2. Literature Review

The literature can be classified in 4 groups according to the following groups of topics: (1) Event capture and visibility, (2) Analytics and automation of events and decision making, (3) Distributed traceability, (4) Resilience-oriented simulation. The first cluster focuses on mapping physical logistics operations and processes to analyzable event streams by using technologies of IoT and Logistics 4.0. The Internet of Things application in the supply chain management and embedded sustainable supply chains literature suggests that Internet of Things technology can reduce the latency of information provided by sensors, RFID, smart objects and connected logistics assets and enhance supply chain traceability [3, 16]. But one common feature that appears in every one of these papers is that there is a disconnect between connectivity and visibility, which isn't the case. Event governance, schema alignment and exception prioritization are necessary to support scalable enterprise architecture. Interconnection and decentralization of logistics are also emphasized in Logistics 4.0, but there is less emphasis on throughput, fault-tolerance, stream processing, and cross-firm event standards [4]. The second one is about linking eventful environments and analytics, and automated control. Multi-agent systems assisted by the processing of big data to increase the agility of the supply chain, allowing dispersed decision entities to respond to changes in operational information is proposed by Giannakis and Louis [5]. Papadopoulos and co-authors associate big data with disaster-resilient supply chains and argue that big data can help in continuity in the case of disruptions, provided that the data is timely and relevant to the decision making process [6]. Wamba and co-authors also correlate big data analytics with firm performance in terms of dynamic capabilities, thus indicating that value of the event-driven logistics is correlated with the capability of the organization to sense and reconfigure resources and not only to technical data pipelines [7]. It is crucial to manage the types of data, decision models, and managerial goals in order to align the operations analytics (Choi, Wallace, & Wang) [13]. One of the disadvantages with this cluster is that it lacks analysis on the architecture level for latency, back-pressure and scalability, as well as assessment of benefits on the organization and process level. The third group has to do with blockchain and distributed traceability. Kshetri presents the applications of a blockchain in the supply chain objectives such as fraud prevention, verification of transactions and supply chain provenance [8]. Saberi and colleagues associate blockchain with sustainable supply chain management, focusing transparency and accountability [10]. Kamble, Gunasekaran and Arha delve into technology, organization and environment, which influence the adoption of blockchain in the supply chain [11]. Queiroz and Wamba study the underlying factors behind adoption for India and the United States, and provide an example of the importance of the institutional context to being blockchain ready [12]. When thinking of event-driven logistics, the studies are of great importance because they can be performed as a shared event ledger with blockchain. However, the literature is not specific in its explanations of the correlation of the two types of events and the two types of entries. Not all scans, temperature and vehicle signals can be efficiently and economically recorded on a blockchain. The question is how to partition the architecture so that some events have to be stored in a shared multi-party ledger, some types of events have to be processed in a fast internal stream and

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some events can be stored in “normal” databases. The fourth group concerns disruption propagation, ripple effects, and digital twins. Digital technology and Industry 4.0 shift the visual profile of supply chain risk analytics to enable detection and analysis of ripples to happen faster, Ivanov, Dolgui and Sokolov show [9]. Later Ivanov demonstrates using simulation the effect of an epidemic interruption on a global supply chain and how the use of real time signals and knowledge of the network structure can be used to predict the effect. In the perspective of Industry 4.0, Ivanov and Dolgui put forward digital supply chain twin as a means to withstand disruption risk and raise digital supply chain resilience [15]. It is especially relevant to scalable event-driven architecture because digital twin applications require a flow of events to keep the state of a computational model up to date. But a lot of the papers which are twin oriented are focused on modelling capabilities rather than focusing on enterprise event plumbing including event semantics, data ownership and governance between logistics partners, and the frequency of synchronization shown in Table 1.

Table 1 Summary of key findings

Ref	Focus	Key Findings
[5]	Multi-agent big data processing for supply chain agility	Distributed agents supported by large-scale data processing improved responsiveness, but validation remained architecture-specific.
[6]	Big data and disaster-resilient supply chains	Timely analytics supported disruption interpretation, although causal links to resilience were difficult to isolate.
[7]	Big data analytics and dynamic capabilities	Analytics value depended on sensing and reconfiguration capability, not data volume alone.
[8]	Blockchain objectives in supply chain management	Blockchain strengthened provenance and verification, but scalability and integration burdens remained material.
[9]	Digital technology and ripple-effect risk analytics	Industry 4.0 data improved disruption visibility, although modelling assumptions shaped results strongly.
[10]	Blockchain and sustainable supply chain management	Distributed ledgers supported transparency, yet adoption required governance across many partners.
[11]	Blockchain adoption in supply chains	Adoption was conditioned by technical readiness, organizational fit, and environmental pressure.
[12]	Blockchain adoption drivers across national contexts	Institutional context affected adoption drivers, limiting universal architecture prescriptions.

The literature provides a set of building blocks for scalable event-driven logistics, however no definite reference architecture is given, as is shown in the following table. Responsiveness and Resilience are what Analytics studies, while Auditability and Shared Verification are what Blockchain studies and Visibility is what IoT and Logistics 4.0 studies. The biggest missing link is integration of these objectives. The enterprise logistics architecture should be able to receive an enormous amount of events generated by operations, select the events required for auditing purposes, be capable of initiating the automatic decision making and automatic update of risk models without any unnecessary coupling between the systems or companies.

3. Methodology

The methods mentioned in the literature analyzed can be divided into review-based conceptualization, empirical adoption analysis, analytical modelling, simulation and architecture-oriented design. Review studies shed light on technology bundles and research themes, but are often vague in their definition of technology, for example, by grouping various technologies under IoT, Industry 4.0, or Logistics 4.0 [1]–[4, 16]. Empirical adoption studies analyze how ready organizations are and what factors drive

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organizational adoption, particularly in blockchain-enabled supply chains [11, 12]. There are analytics-oriented studies that examine relationships between data capability, dynamic capabilities and performance outcomes [7] and operations analytics studies that examine the fit of the data, models and decisions [13]. Twin research and simulation are employed to examine the propagation and recovery of the disruption, particularly in cases where direct experimentation, e.g., in the worldwide logistics network, is not feasible [14] [15]. These methodical patterns dictate visible and invisible. Review papers are good at conceptual space mapping, but bad at latency, throughput, load resilience, or enterprise integration cost. Empirical adoption studies reveal organizational constraints, but do not usually examine event architecture design in any depth. Model quality relies on the freshness of the data, the event fidelity, and the structure of the model used, while simulation studies reveal the dynamic behaviour under disruption. Blockchain studies offer trust and provenance of immutable event records, but they tend to delve into the aspects of high-throughput stream-processing requirements. In the end, scalable event-driven architecture does not seem like an explicit measurement in the studies, but rather a stated expectation shown in Table 2.

Table 2 Method comparison

Ref	Method	Strengths	Limitations
[3]	Structured literature review of IoT in supply chain management	Connects sensing, identification, and communication to visibility and responsiveness.	Limited architecture-level benchmarking of event throughput and governance.
[5]	Multi-agent architecture with big data processing	Models distributed decision logic suitable for exception-driven logistics.	Generalization beyond the studied architecture remains limited.
[7]	Empirical analysis of analytics capability and performance	Links analytics value to dynamic organizational capability.	Does not isolate event-stream architecture as an independent mechanism.
[11]	Adoption modelling for blockchain supply chains	Identifies implementation drivers relevant to shared event ledgers.	Gives limited detail on interaction with real-time operational event streams.
[13]	Operations analytics review	Clarifies data-model-decision alignment for operational settings.	Broad operations scope dilutes logistics-specific event architecture detail.
[14]	Simulation-based disruption analysis	Captures dynamic disruption propagation and scenario effects.	Reliability depends on event freshness and network model validity.
[15]	Digital supply chain twin conceptual modelling	Frames continuous state updating for disruption risk management.	Practical data ownership and synchronization constraints remain unresolved.
[16]	Review of IoT-embedded sustainable supply chains	Shows fit between IoT sensing and Industry 4.0 supply chain requirements.	Scalability and semantic interoperability receive limited technical treatment.

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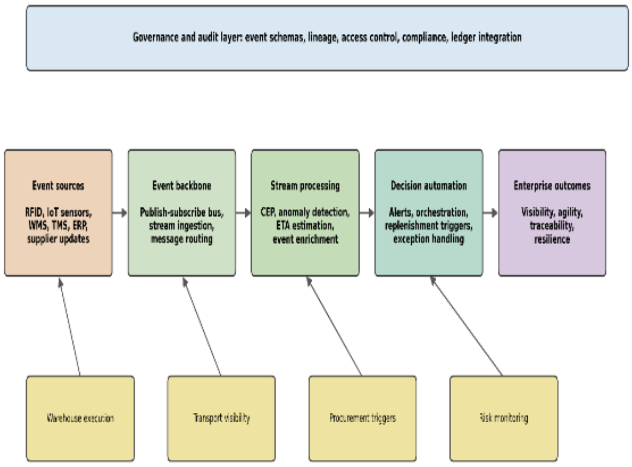

Figure 1 Layered event architecture for scalable enterprise supply chain and logistics

4. Discussion

The reviewed literature shows that event-driven architectures for enterprise supply chain and logistics are value creating in four ways: by enabling shortened information latency, by enhancing event interpretability, by automating exception response and by providing co-ordinated traceability. In all reports on IoT related activities, the first benefit is the visibility of work, as states in the physical logistics become visible with the use of identification technologies and connected devices [3, 16]. But that's not the same thing as scalability. The event driven design should be able to differentiate between routine high volume events and exceptions that require decisions. If noise is to be avoided in the name of operational intelligence, it is of paramount importance to filter, aggregate and harmonize the semantics of the sensors. The restriction also holds true for other studies on IoT and Logistics 4.0 (L4.0), which focus on connectivity but offer less metrics for the prioritisation of events, streaming quality, or integration overhead of enterprises [3, 4, 16]. Analytics studies provide a deeper understanding of how streams of events become logistics capability. Research on multi-agent and big data processing demonstrates that distributed decision entities can enhance their agility by reacting to the changes in the supply chain without awaiting the next planning period [5]. Disaster-resilience and dynamic-capability research further confirms that there is a link between organizational ability to reconfigure resources once the signals are interpreted and their analytics value [6] [7]. This is significant as an event-driven architecture can provide alerts quickly, but the impact of the event is reliant on enterprise routines and procedures and also on the authority of the enterprise that is permitted to act quickly. In logistics situations, an occurrence like a port delay, carrier failure, temperature damage, or inventory shortage isn't valuable simply because it's being identified. It is a value that relies on routing the event to a suitable decision service, estimating the operational impact and initiating viable mitigation. The blockchain research takes the discussion away from speed and towards verifiability. Related blockchain studies [10]–[12] similarly address transparency, adoption, and institutional readiness. This is a technical dilemma in case of scalable event-driven logistics. High frequency events demand low latency ingestion and processing; blockchain systems are best suited for a selected event, where auditability, dispute resolution, and multi-party confidence are desired. For instance, if a temperature reading is taken every few seconds, then a stream engine may be appropriate to process most of these, while only exception summaries, custody transfers, or compliance proofs are written to an immutable ledger. This partitioning problem is seldom addressed in the literature. This is why blockchain is sometimes referred to as a general solution for traceability, instead of its architectural meaning which is to be a selective notarization of the states of the events. Event-driven studies most clearly connect event-driven architecture with enterprise risk management. Ripple-effect analytics and simulation of an epidemic disruption prove that digital signals can help in anticipation and evaluation of cascading failures [9], [14]. The idea of digital supply chain twin research extends the concept with the aim of representing the state of the supply network in a computational way that can be updated when events occur [15]. The assumption is large: for resilience modelling, the data layer is event-driven architecture. However, the performance of the digital twin relies on the fidelity of events, model calibration, synchronization time intervals, and the choice of boundaries. Twin that updates inventory but not carrier capacity or supplier disruption or congestion at the border may yield false confidence. However,

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the detailed twin can be challenging to manage across firms. The results of the studies reviewed are summarized and compared in Table 3. As shown in the comparison, there are system context-specific implications for the architecture. The research areas with strong results are: IoT and Logistics 4.0 (visibility); Analytics research (agility and decision support); Blockchain research (provenance); Simulation/twin research (resilience). There are few studies that assess all four dimensions in a single scalable architecture shown in Table 3.

Table 3 Results comparison

Ref	System / Context	Metric / Basis of Comparison	Outcome
[3]	IoT-enabled supply chain management	Visibility, sensing integration, data quality	IoT improved observability but exposed integration and privacy constraints.
[5]	Multi-agent supply chain with big data processing	Agility and distributed decision response	Agent-based processing supported faster response to operational change.
[6]	Disaster-resilient supply chain analytics	Disruption interpretation and sustainability linkage	Big data aided resilience explanation, but causal attribution remained difficult.
[8]	Blockchain-enabled supply chain objectives	Provenance, verification, fraud reduction	Immutable records supported traceability goals, with scalability trade-offs.
[9]	Industry 4.0 ripple-effect analytics	Risk propagation and disruption visibility	Digital technologies improved analytical visibility of cascading failures.
[12]	Blockchain adoption in India and the United States	Adoption drivers and institutional context	Context shaped adoption drivers, limiting universal event-ledger designs.
[14]	Global supply chain epidemic disruption	Simulation scenarios and disruption impact	Simulation clarified cascading disruption effects and response timing.
[15]	Digital supply chain twin for disruption risk	Continuous state representation and resilience planning	Twin logic supported risk management but depended on live data quality.

Another trend that's around is from linear integration to event ecosystems. Enterprise integration is typically done by scheduling applications for integration (data exchange) or by synchronizing transactions. Through a review of the literature, it was found that there are architectures which share events multiple times after publish, such as warehouse alerts, transport ETA recalculation, procurement replenishment, compliance logging, and risk simulation. This pattern decreases the point-to-point coupling and introduces new governance issues. Event schemas need to be stable to be used by external partners, and flexible enough to allow for operations changes. It is essential that access control be put in place to protect commercial sensitive logistics information, while maintaining visibility sharing. These issues have been addressed in the literature, albeit indirectly, as privacy, adoption and interoperability issues, and there are no established design principles for cross-enterprise event contracts in the literature. The source pool evidence for 2015-2025 is shown in Figure 2. It shows focus on IoT, analytics, blockchain and resilience research, not necessarily as literature on architecture. The stacked bar chart shows the number of reviewed journal articles and the research focus that would have been the main focus of the journal article by year. It is important because while there is a strong evidence base for scalable event-driven logistics with a wide range of perspectives, it is not uniform, with more focus on blockchain approaches and analytics than on direct evaluation of the architecture scalability. The coding of the 16 journal articles reviewed (refer to the References section) was done manually shown in figure 2

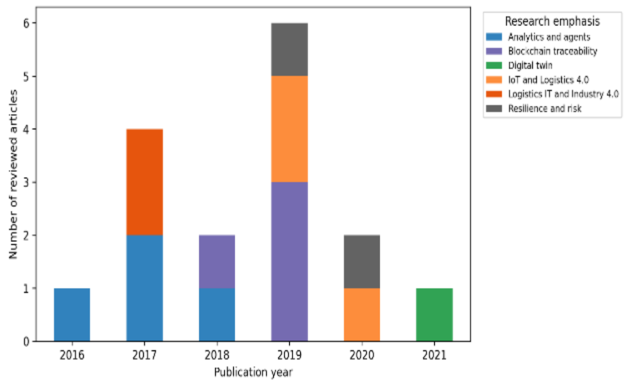

Figure 2 Evidence distribution by year and research emphasis

There are also technical contradictions found between the studies. Event-driven processing requires low latency processing while blockchain focuses on consensus, immutability and shared validation. Distributed agents are beneficial in event-driven logistics, but an enterprise governance may prefer to have a centralized control for accountability. While digital twins need to be constantly updated, it can be difficult to share data across enterprises, as it is often secured, owned, or not standardized. More IoT adds more granularity to events, and more granularity requires more storage, more quality and/or more filtering. The above paradoxes suggest that there is no possible way to achieve high speeds, high auditability, high autonomy and confidentiality in scalable architecture. Event class needs to be explicitly stated in architectural design. For example, in the case of shipment milestone events, they must be widely shared; in the case of sensor telemetry, they must be edge-aggregated; in the case of compliance events, they must be registered immutably; in the case of disruption signals, they must be quick to propagate into risk models. There is an integrative comparison of architectural mechanisms and logistics outcomes in figure 3. Uses the size of the bubbles to represent the strength of the support found in the literature examined in the reviewed literature, and also intends to emphasise that there is no single mechanism to solve all enterprise logistics outcomes. The bubble matrix is a quantification of how well the core event-driven mechanisms provide visibility, latency reduction, traceability, agility and resilience in enterprise supply chain and logistics. It is important because the choice of individual combinations of mechanisms is what leads to scalable architecture design and not individual technology classes. Interpretive scoring that reflects and/or suggests results from [3] and [5] – [16]. The most important thing is that scalable event driven architectures should be seen as socio-technical infrastructures and be analysed as such. There are numerous examples in the literature of technologic failures that are not going to produce logistics performance. To start with, analytics needs to be agile [7] and on the other, the blockchain needs to be ready for adoption and organised inter-organisational governance [11] and [12], IoT needs to be integrated and the data quality must be good [3] and last but not least, the digital twin should have valid representations of events [15]. Future empirical studies should instead use technical and

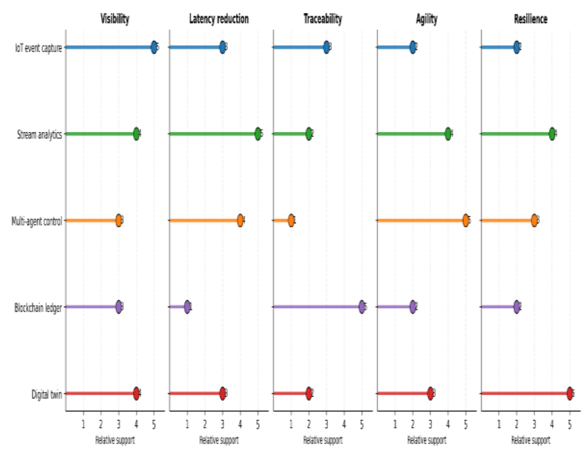

Figure 3 Relationship between architectural mechanisms and logistics outcomes

operational measures such as: event latency; decision cycle time; rate of exception resolution; partner participation; completeness of event's provenance; and disruption recovery time. Without these metrics, there will be only architectural value in enterprise supply chain and logistics research in terms of technology adoption and not directly on architecture performance.

5. Future Directions

The analysis of scalable event-driven enterprise supply chain and logistics architectures has to move from assessing a specific technology to architecture validation in the future. First, research should provide a benchmark for the event pipelines while operating under realistic conditions of logistic load, such as bursty sensor telemetry, transport milestone updates, warehouse execution events, and disruption alerts. There are existing works on IoT and Logistics 4.0 that helps in advocating real-time visibility; however, most of the works are limited in reporting latency, event loss, replay, schema evolution and back-pressure in enterprise use cases [3] [4] [16]. Second, research should be carried out to build up cross enterprise logistics event class governance models. The studies of the blockchain have demonstrated the role of verification shared but also have suggested that not all events need be registered immutably [8, 10]–[12]. There is need for further research to classify logistics events according to the value of the audit performed, latency sensitivity, privacy exposure and criticality to decision. This would allow distributed ledger, operational database and stream processor to be used for partitioning of architecture. Last, the relationship between Digital Twin/prediction studies and the actual event architecture should be further coupled. Dynamic modelling has been proven to be valuable, as in simulation-based disruption research [9, [14] and real-time state representation has been proven to be valuable for resilience research as in digital twin work [15]. Future studies, however, should incorporate the frequency of synchronization, data quality thresholds, model drift controls, and controls on partner data access rules. These parameters will help to resolve some of the issues which will be considered in enterprise decision-making during the times of volatility. The fourth is to link information systems, operations management, logistics engineering and SC governance in interdisciplinary research. Not only is scalable event-driven logistics a technical design challenge, but it is also a key business concern. It extends to the sharing of data, regulatory auditing, cyber-risk and organisational control of automated actions within the contract. The technical reliability, the operational responsiveness, the provenance quality and the resilience outcomes should all be considered in a well-developed research program to assess architectures.

Conclusion

The research emphasis of event-driven architectures for enterprise supply chain and logistics is one of the major research areas as the performance of logistics in the modern world is dependent on the ability to interpret and take action on enterprise events. Increased visibility through IoT, agility with analytics, traceability with blockchain and resilience with digital twins are evident in the literature reviewed. However, the pieces of the jigsaw are still divided between technology streams. The main idea of the research is the enterprise value, resulting from the coordinated integration of event capture, routing, analytics, decision automation and governance as an integrated architecture. Weaknesses continue to be in the area of architecture-level evidence. However, there are few studies that directly measure event latency, event throughput, semantic interoperability, event governance, and constraints on cross-enterprise data-sharing. The results of previous research also indicate that there are trade-offs among speed, auditability, autonomy, and confidentiality. Future developments should focus on designing events, selective ledger integration, validated stream-processing performance, and on-the-fly connection between event pipelines and digital supply chain twins. Research will be instrumental in driving forward the field, as it moves away from the use of event-driven logistics as just a set of discrete digital technologies, and towards a view where event-driven logistics is a socio-technical infrastructure.

References

[1]. Gunasekaran, A., Subramanian, N., & Papadopoulos, T. (2017). Information technology for competitive advantage within logistics and supply chains: A review.

Transportation Research Part E: Logistics and Transportation Review, 99, 14–33.

[2]. Hofmann, E., & Rüsch, M. (2017). Industry 4.0 and the current status as well as future prospects on logistics. Computers in Industry, 89, 23–34.

[3]. Ben-Daya, M., Hassini, E., & Bahroun, Z. (2019). Internet of things and supply chain management: A literature review. International Journal of Production Research, 57(15–16), 4719–4742.

[4]. Winkelhaus, S., & Grosse, E. H. (2020). Logistics 4.0: A systematic review towards a new logistics system. International Journal of Production Research, 58(1), 18–43.

[5]. Giannakis, M., & Louis, M. (2016). A multi-agent based system with big data processing for enhanced supply chain agility. Journal of Enterprise Information Management, 29(5), 706–727.

[6]. Papadopoulos, T., Gunasekaran, A., Dubey, R., Altay, N., Childe, S. J., & Fosso Wamba, S. (2017). The role of big data in explaining disaster resilience in supply chains for sustainability. Journal of Cleaner Production, 142, 1108–1118.

[7]. Wamba, S. F., Gunasekaran, A., Akter, S., Ren, S. J., Dubey, R., & Childe, S. J. (2017). Big data analytics and firm performance: Effects of dynamic capabilities. Journal of Business Research, 70, 356–365.

[8]. Kshetri, N. (2018). Blockchain's roles in meeting key supply chain management objectives. International Journal of Information Management, 39, 80–89.

[9]. Ivanov, D., Dolgui, A., & Sokolov, B. (2019). The impact of digital technology and Industry 4.0 on the ripple effect and supply chain risk analytics. International Journal of Production Research, 57(3), 829–846.

[10]. Saberi, S., Kouhizadeh, M., Sarkis, J., & Shen, L. (2019). Blockchain technology and its relationships to sustainable supply chain management. International Journal of Production Research, 57(7), 2117–2135.

[11]. Kamble, S. S., Gunasekaran, A., & Arha, H. (2019). Understanding the blockchain technology adoption in supply chains-Indian context. International Journal of Production Research, 57(7), 2009–2033.

[12]. Queiroz, M. M., & Wamba, S. F. (2019). Blockchain adoption challenges in supply chain: An empirical investigation of the main drivers in India and the USA. International Journal of Information Management, 46, 70–82.

[13]. Choi, T.-M., Wallace, S. W., & Wang, Y. (2018). Big data analytics in operations management. Production and Operations Management, 27(10), 1868–1883.

[14]. Ivanov, D. (2020). Predicting the impacts of epidemic outbreaks on global supply chains: A simulation-based analysis on the coronavirus outbreak. Transportation Research Part E: Logistics and Transportation Review, 136, 101922.

[15]. Ivanov, D., & Dolgui, A. (2021). A digital supply chain twin for managing the disruption risks and resilience in the era of Industry 4.0. Production Planning & Control, 32(9), 775–788.

[16]. Manavalan, E., & Jayakrishna, K. (2019). A review of Internet of Things embedded sustainable supply chain for Industry 4.0 requirements. Computers & Industrial Engineering, 127, 925–953.