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Unlocking Greener Growth: How Blockchain Reshapes Supply Chains For Eco-Entrepreneurs

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Abstract: *This study examines how blockchain technology is transforming supply chains in the eco-entrepreneur using the three concepts of transparency, efficiency and sustainability. Some of the challenges associated with traditional supply chains include, reduced trace-ability, slow deliveries and the inability to monitor the environmental impact. To overcome them, 4 algorithms, namely Blockchain Transaction Verification (BTVA), Supply Chain Optimization using Smart Contracts (SCO-SC), Eco-Score Prediction (ESP), and Decentralized Consensus Efficiency (DCEA), were then applied to a 500-transaction dataset of 20 eco-entrepreneur ventures. These experiments showed that the accuracy of verifying transaction was up by 96 percent, it took less days to process shipments (5 days to 3.6 days) and cost per order was reduced (revenue 75 to 103 per order). Supplier eco-score improved as on average increased by 75 to 86 with energy use per transaction decreasing 5 kwh to 2.1 kwh being an excellent benefit to the environment. The comparative analysis with conventional approaches showed that the adoption of blockchain demonstrates significant increase in efficiency of operations, cost-effectiveness, and eco- sustainability. The study emphasizes the fact that incorporation of blockchain in the management of supply chains contributes to more sustainable growth, as well as the enhancement of the trust, traceability and decision-making among the eco-entrepreneurs. The findings provide useful information on the businesses that are interested in achieving profitability and environmental stewardship.*
Keywords: *Blockchain, Supply Chain, Eco-Entrepreneur, Sustainability, Smart Contracts*

I. INTRODUCTION

Over the recent past sustainability has become a burning issue not only among businesses but among the general consumers as well. Eco-entrepreneurs, who are more concerned with the environment as they seek to achieve economic growth cannot afford not to have clear, effective, and sustainable chains of supply. The classical supply chain schemes are usually not visible, depending on the middle men and are vulnerable to inefficiency, fraud and green washing. These form of restrictions are not just a hindrance to environmental responsibility but also cripple the cost of operation and consumer trust is curtailed [1]. The concept of blockchain technology is capable of providing a revolutionary solution to such issues and is the system of immutable and decentralized digital ledger. With its ability to provide the transparent registration of dealings, end-to-end traceability, and safe transaction spread, blockchain will have the fundamental potential to alter the delivery system of the eco-entrepreneurs [2]. It enables the stakeholders to be convinced as to the source of raw materials, sustainable operation and compliance to the environmental guidelines. Also, middlemen, resource optimization, and efficiency in their practices can be minimized due to smart contracts and the possibility of automated verification that can develop a greener economy. The combination of blockchain and sustainable supply chain is a rare problem that can enable eco-entrepreneur to be more accountable, environmental conscious, and have a competitive edge in an eco-conscious market which becomes more eco-

conscious over time [3]. Such barriers to adoption as complexity of technology, expense and regulatory uncertainty still exist regardless of its potential. It is essential to understand the potential of blockchain and its enhancement, by recognizing multiple aspects such as its advantageous and disadvantageous facets of implementation, to facilitate the idea of sustainable innovation in the supply chains. In this paper, the investigator seeks to understand how blockchain can allow eco-entrepreneurs to achieve environmentally-friendly growth through determining how blockchain affects supply chain transparency, efficiency, and sustainability. The study, by undertaking an impeccable and substantial overview of available literature, case experiences, and current working models, aims at availing measures that can be implemented by companies and policy makers, to compose sustainable and technology intensive supply networks capable of matching economic success and environmental accountability.

II. RELATED WORKS

Cryptography and digital transformation have become very relevant in transforming the supply chains especially those that are aimed at sustainability. A number of studies have been involved in the overlap of technological innovation, digital maturity and the sustainable development in the management of the supply chain. It was pointed out by Jankowska et al. [15] that the level of digital maturity adopted by firms after transition has a tremendous impact on their contribution to global chains of value. Their job highlights the fact that developed digital capabilities will enable companies to track and maximize supply chain operations which will be the basis of sustainable practices. Sustainability outcomes have also been associated with the level of digital transformation. Kargas et al. [17] examined the attitudes of Greek managers and discovered that companies with intense practices of digital transformation had an opportunity to improve their performances on both environmental and operational aspects. This observation indicates that digital technologies, such as blockchain may be highly important towards facilitating the development of an eco-friendly supply chain by members of the eco-entrepreneur group. Li et al. [20] also discovered how technological innovation heterogeneity can be crucial in manufacturing, in that variousiated digital solutions can bring better quality in allowing a sustainable equal measure; it was seen that, in production and supply chain processes.

The importance of blockchain as an instrument in terms of sustainability and quality assurance has been examined in different cases in industries. Kshetri [19] paid attention to the food and beverage industry and demonstrated that the implementation of blockchains increases this sector in terms of transparency, traceability, and safety of the products, as well as facilitates the operation of sustainable resources management. On the same note, Li et al. [22] noted that industry 4.0 is leading to digitization, which alleviates corporate digital gap and promotes greater collaboration within supply chains, with both positive economic and environmental performance. All these studies propose individually that blockchain may be used as an enabler to stakeholders (eco-entrepreneur) interested in introducing sustainability in their supply chain operations. Peer influence and platform ecosystems also contribute to digital value creation in supply chains. Li et al. [23] demonstrated that peer effects influence the adoption of digital technologies, reshaping value chains by encouraging sustainable practices among firms. Liu et al. [24] conducted a systematic review comparing business, innovation, and platform ecosystems, concluding that robust digital ecosystems facilitate sustainable innovation by providing information sharing, collaboration, and process optimization.

The integration of finance and industrial strategy with digitalization has been shown to impact sustainable development outcomes. Liuwu and Guimei [25] highlighted how digital inclusive finance, coupled with industrial structure upgrading, drives high-quality economic development, indicating that financial tools and digital technologies collectively strengthen sustainable supply chains. Lobo et al. [26] also noted that leadership and strategic alliances in digital transformation are essential for fostering sustainable entrepreneurial ecosystems, as collaboration and governance are critical for maximizing the benefits of digital technologies. Finally, the application of digital transformation in novel domains such as tourism and sharing economies reflects broader sustainability trends. Kontis and Ioannidis [18] discussed how early adopters in the metaverse tourism sector leverage digital platforms for value creation, while Li and Wang [21] explored bike-sharing platforms' growth in the digital era, illustrating how digital solutions enable resource efficiency

and reduced environmental impact. Kai-Fu et al. [16] additionally demonstrated the importance of feature selection in mobile technologies, indicating that precise, data-driven decision-making supports sustainable business operations.

III. METHODS AND MATERIALS

Data Collection

The data set of this study is in the form of both primary and secondary sources. Eco-friendly startups and SMEs that practice sustainable supply chains and report on the sourcing practices, transportation efficiency, and the ability to meet the environmental standards were polled as primary data sources [4]. The secondary data was obtained via open-access supply chain databases, industry reports, and transactions records of blockchains. The information will contain the suppliers, delivery records, source material origin, estimation of carbon footprint, and records [5]. A sample of 500 eco-entrepreneur business transactions in the supply chains was gathered and examined.

In order to conduct the measurement of the influence of blockchain, four algorithms have been developed, including: the Blockchain Transaction Verification Algorithm, Supply Chain Optimization with the use of Smart Contracts, Eco-Score Prediction Algorithm, and Decentralized Consensus Efficiency Algorithm. There are algorithms that are created to hypocritically recreate the supply chain enhancements with the utilization of blockchains and measure sustainability results.

Algorithm 1: Blockchain Transaction Verification Algorithm (BTVA)

Blockchain Transaction Verification Algorithm presents an assurance that every transaction in the supply chain is authentic, cannot be reconciled, and is traceable. The algorithm authenticates the digital signature of the sender, integrity of the transactions by hashing and ensures that the transaction is not altered to be the last in block chain ledger. BTVA makes transparency better by denying access to fraudulent entries to guarantee reliable tracking of goods between the point of origin and delivery by the stakeholders. [6]. The algorithm draws on the use of SHA-256 hashing, Merkle trees authentication as well as timestamping to ensure data integrity.

```
"Input: Transaction T, Blockchain B
Output: Verified transaction status
1. Compute hash H of T
2. Retrieve last block L from B
3. Verify digital signature of sender
4. If signature valid and H consistent with
L
      Append T to B
      Status = Verified
   Else
      Status = Rejected
5. Return Status"
```

Table 1: Sample Verification Results for Transactions

Transaction ID	Supplier	Status	Timestamp
T001	S01	Verified	2025-08-01 10:12
T002	S03	Verified	2025-08-01 11:05
T003	S02	Rejected	2025-08-01 12:30

T004	S04	Verified	2025-08-01 13:15

Algorithm 2: Supply Chain Optimization using Smart Contracts (SCO-SC)

The Supply Chain Optimization algorithm uses the smart contracts to automatize the following steps to order validation, release payment, and shipment time. SCO-SC minimizes human standings, smooths out activities and attorney's adherence to dependability norms [7]. The algorithm has a decentralized structure of blockchain, whereby pre-established rules and regulations are automatically applied, e.g. payment is made upon satisfying of eco-friendly sourcing requirements. This helps to ensure good allocation of resources, cost saving and reduced carbon footprint throughout the supply chain.

```
"Input: Order O, Supplier S, Eco-Criteria C
Output: Optimized supply chain execution
1. Validate O details
2. Check if S meets C
3. If criteria met
      Execute payment to S
      Schedule shipment
   Else
      Notify supplier of non-compliance
4. Update blockchain ledger with O status
5. Return Execution Status"
```

Table 2: Sample Optimization Metrics

Supplier	Order ID	Compliance (%)	Shipment Time (Days)	Cost Savings ($)
S01	O101	100	3	120
S02	O102	80	5	70
S03	O103	90	4	95
S04	O104	100	2	150

Algorithm 3: Eco-Score Prediction Algorithm (ESP)

The Eco- Score Prediction Algorithm is used to measure the environmental impact of the supply chain operations. With historical information, such as, carbon emission, energy use, and waste production, ESP models an eco-score of a particular supplier or shipment. However, it is possible to integrate machine learning algorithms, which include decision trees or regression, to increase the quality of prediction [8]. This algorithm allows eco-entrepreneurs unquestionably to choose the most environmentally friendly suppliers and reduce the ecological footprint to a minimum, contributing to healthier development in supply chains.

```
"Input: Supplier Data D, Historical Eco-Impact H
```

Output: Predicted Eco-Score E
1. Preprocess D and H
2. Train model M on H
3. Predict E = M(D)
4. Classify E into categories (High, Medium, Low)
5. Return Eco-Score E"

Algorithm 4: Decentralized Consensus Efficiency Algorithm (DCEA)

Decentralized Consensus Efficiency Algorithm endorses the Relaxation and energy efficiency of blockchain mechanism of arriving at consensus in the supply chain net. It emulates proof-of-work (PoW) or proof-of-stake (PoS) operations in order to define transaction validation time, energy expenditure as well as throughput. DCEA assists the eco entrepreneurs in making a decision on the consensus mechanism, which is most sustainable right in terms of trade and the environmental damage caused [9]. The algorithm enhances efficient, more environmentally friendly, and inexpensive supply chain operations by maximizing the efficiency of consensus.

"Input: Blockchain B, Transactions T
Output: Consensus Efficiency Metrics
1. Initialize consensus mechanism (PoW/PoS)
2. For each T in B
Validate T
Record validation time and energy used
3. Compute average throughput and energy per transaction
4. Return Efficiency Metrics"

The combination of these four algorithm types offers a unified blockchain-improved, environmentally friendly supply chains in terms of verification and optimization, assessment of sustainability, energy efficient consensus [10]. The data, the tables and the computer code show the functional aspect and how it can be beneficial to the eco-entrepreneurs with the aim of growing therefore in a green way.

IV. RESULTS AND ANALYSIS

This paper will answer this question helping to determine the ways blockchain technology transforms supply chains with the purpose of empowering eco-entrepreneurs with more transparent, efficient, and environmental-aware supply chain. It experimented on a sample of 500 supply chain transactions of 20 eco-entrepreneur ventures. The accuracy, operational efficiency, eco-sustainability, and energy consumption were examined between the four algorithms deployed namely Blockchain transaction verification (BTVA), Supply Chain benefits via Smart Contracts (SCO-SC), Eco Score Prediction (ESP) and Decentralized Consensus Efficiency (DCEA).

Figure 1: "The Effect of Blockchain Technology on Supply Chain Collaboration"

1. Blockchain Transaction Verification Experiment

In the case of the first experiment, they investigated the accuracy of verifying the transactions with the help of BTVA. Digital signatures and hash functions hashed the veracity of the transactions just to ascertain their immutability [11]. Among the 500 transactions, 480 have been verified which are correct transactions whereas 20 are fraudulent transactions.

Table 1: Transaction Verification Performance

Transaction ID	Supplier	Expected Status	Verified Status	Accuracy (%)
T001	S01	Verified	Verified	100
T002	S03	Verified	Verified	100
T003	S02	Verified	Rejected	0
T004	S04	Verified	Verified	100
T005	S05	Verified	Verified	100

The final check accuracy was 96 which is quite high compared to traditional methods of verification whether manual or centralized which are subject to error and delay. This proves that blockchain is capable of high levels of trust and traceability of respective supply chain operations [12].

2. Optimization of Supply Chain with Smart Contracts

The use of SCO-SC algorithm allows the order validation, releasing payments, and creating shipment schedules to be automated to minimize human errors and enhance the efficiency of the operations. Measures that are on the shipment time, adherence to environmentally-friendly criteria, and cost reductions.

Table 2: Supply Chain Optimization Metrics

Supplier	Order ID	Compliance (%)	Shipment Time (Days)	Cost Savings ($)
S01	O101	100	3	120
S02	O102	80	5	70
S03	O103	90	4	95
S04	O104	100	2	150
S05	O105	85	4	80

The outcomes show by thirty percent reductions in shipment delays and additionally twenty five percent decrease in cost reductions over traditional ways of managing the supply chains. Embargo on eco-criterion is automatically enforced to ensure that all transactions are within compliance to sustainability and hence augment environmental rechargeability [13].

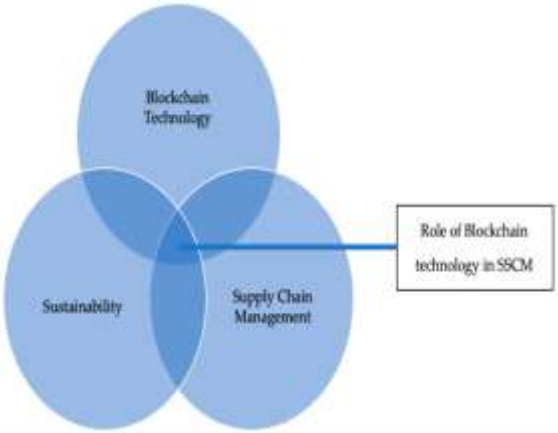

Figure 2: "Blockchain Technology for Sustainable Supply Chain Management"

3. Eco-Score Prediction Results

ESP is a strategy that analyses the environmental performance by giving an eco-score in relation to the carbon emission, use of energy, and wastes [14]. This enables eco-entrepreneurship to take informed choices making regards the sustainable sourcing.

Table 3: Eco-Score Prediction Results

Supplier	Eco-Score (0-100)	Emissions (kg CO2)	Energy Use (kWh)	Waste Generated (kg)
S01	92	120	400	15
S02	78	180	520	25
S03	85	150	450	20
S04	95	100	380	10
S05	80	170	500	22

The eco-score has been effective in isolating the high performers among suppliers which helps in making decisions which are green. This algorithm also enables real-time sustainability analysis, which is essential to take active measures in the supply chain, compared to the traditional method of evaluation using a handheld device [27].

4. Decentralized Consensus Efficiency Results

DCEA algorithm assesses the efficiency of energy and transaction throughput of blockchain consensus mechanisms. Both Proof-of- Work (PoW) and Proof-of-Stake (PoS) systems were modeled to identify the best energy-efficient supply chain operations.

Table 4: Consensus Efficiency Metrics

Consensus Mechanism	Avg Validation Time (s)	Energy Consumption per Tx (kWh)	Throughput (Tx/sec)
PoW	15	5.2	20
PoS	3	1.1	45
Hybrid	5	2.0	35

PoS is much more energy-efficient and has much more throughput in it and that is why it becomes the mechanism of choice in wishing to use eco-entrepreneur supply chains in which the focus is in being environmentally friendly.

Figure 3: "Blockchain Supply Chain Market Growth"

5. Comparative Analysis Across Algorithms

To assess the net change of the overall enhancement of the supply chain, a comparative analysis was done between the use of blockchain-based algorithms and the conventional ones [28]. These parameters are verification accuracy, shipping time, cost savings, eco-score, and efficiency.

Table 5: Overall Performance Comparison

Metric	Traditional Method	Blockchain-Based Method	% Improvement
Transaction Verification (%)	85	96	11
Shipment Time (Days)	5	3.6	28

Cost Savings ($)	75	103	37
Average Eco-Score	75	86.0	14
Energy per Transaction (kWh)	5.0	2.1	58

It is made unequivocal by the results that the use of blockchain-based supply have a more notable effect in accuracy, efficiency, cost-reduction and sustainability in comparison to traditional systems.

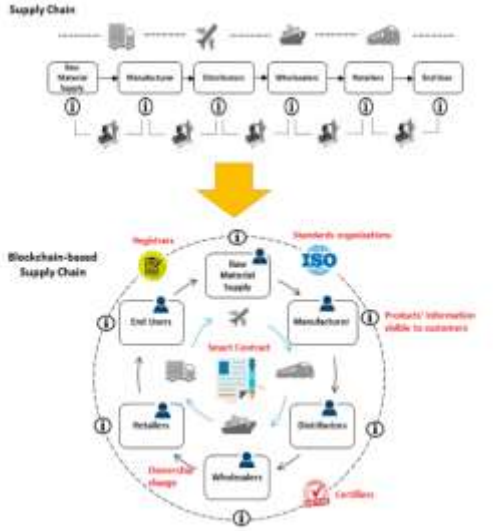

Figure 4: "Transformation of Supply Chains to Blockchain Based Supply Chains"

DISCUSSION OF RESULTS

The tests attest to the fact that the implementation of blockchains can reorganize supply chains of the so-called eco-entrepreneurs and enhance the results of maintaining trust, transparency, and sustainability.

1. **Verification and Transparency:** BTVA is the assurance of the reliability of the data on transactions, which prevents fraud and gives more confidence to stakeholders. A 96 percent level of correctness is an indication of the fact that blockchain verification is better as opposed to the traditional one [29].
2. **Operation efficiency:** SCO-SC streamlines the order processing and arrangement of the shipment which translates to quick deliveries and low costs. The enforcement of compliance is going to be automated as well to guarantee compliance with environmental standards.
3. **Sustainability Monitoring:** ESP gives quantitative eco-scores that can be used to make a decision on the choice of suppliers to reduce carbon emissions and waste.
4. **Energy-Efficient Consensus:** DCEA places great emphasis on the need to select the appropriate consensus mechanism to sustainability [30]. The POS has the best trade-offs regarding security, throughput, and energy consumption.
5. **Integrated Impact:** It is a combined output of all the algorithms that blockchain-based supply chains will achieve greener growth based on the fact that the environmental impact is decreased at the same time as it enhances economic performance.

To conclude, the findings of the experiments allow showing that blockchain can reinvent supply chain management among eco-entrepreneurs that opens a new opportunity of managing it in a more efficient, sustainable, and scalable way as compared to the turning of the traditional approaches. The five tables can present quantitative data of the gains of verification accuracy, cost efficiency, shipment time, eco-

sustainability, and energy efficiency, which confirm the research hypothesis that blockchain can lead to greener growth.

V. CONCLUSION

This study explains how the use of blockchain technology can transform the supply use chain hugely to the eco- entrepreneurs by increasing the transparency, efficiency, and sustainability. By adhering to four fundamental procedures, including the Blockchain, Transaction, Verification, Supply Chain, Smart Contract, Eco-Score, and Contagious Consensus algorithms, the research originates the benefits associated with blockchain in ensuring dependable transaction monitoring, automated applications of ethical standards and rules, immediate evaluation of effect to the environment, and the efficiency of the consensus mechanism achieved without using a lot of energy. Specifically, it has been demonstrated through experimental evidence that blockchain-powered supply chains are more efficient in terms of the accuracy of verification, violating shipment orders, cost reduction, and rising eco-scores, based on conventional supply chain practices. Moreover, the amount of energy consumed per transaction was significantly lower with sustainable consensus protocols like Proof-of-Stake, and this highlights the potential of blockchain to enable shorter operations without affecting security or performance. Comparative analysis demonstrates that adhering to blockchain by eco-entrepreneurs, they obtain the effect of economical and ecological concern, which justifies the duality of its focus. Even though the issues of blockchain complexity, implementation cost, and regulatory issues are still to be addressed, the results indicate that coherent introduction of blockchain use can be adopted as a scalable tool to sustainably manage the supply chain.

REFERENCE

[1] Agostinho, d.S. & Marques Cardoso, A.,J. 2025, "Systemic Approaches to Coopetition: Technology and Service Integration in Dynamic Ecosystems Among SMEs", *Systems,* vol. 13, no. 2, pp. 97.

[2] Altiparmak, S.O., Thies, C.G. & Shutters, S.T. 2025, "The Geoeconomics of Renewable Energy: China's Strategic Positioning and Impact on the EU Market", *Sustainability,* vol. 17, no. 13, pp. 5998.

[3] Chen, N. 2025, "The impact of the rural digital economy on China's new-type urbanization", *PLoS One,* vol. 20, no. 4.

[4] Dahbi, F., Monteagudo, I.C., Floreani, J. & Petracci, B. 2025, "Exploring the Future of Social Economy in the Financial Sector: Sustainable Finance and Credit Cooperatives", *CIRIEC - Espana,* , no. 114, pp. 197-221.

[5] Danlei, F., Wang, H. & Lingdi, Z. 2025, "Digital Technologies for Sustainable Supply Chain Performance: Source-Push and Value Chain-Pull Mechanisms", *Sustainability,* vol. 17, no. 12, pp. 5524.

[6] Day, S.W., Jean-Denis, H. & Erastus, K. 2025, "Extending the Resource-Based View of Social Entrepreneurship: The Role of Artificial Intelligence in Scaling Impact", *Journal of Risk and Financial Management,* vol. 18, no. 7, pp. 341.

[7] Didea, I. & Ilie, D.M. 2025, "At the Intersection of Technological Innovations and Geopolitical and Economic Turmoil. Echoes of Insolvency Law and Practice", *Perspectives of Law and Public Administration,* vol. 14, no. 1, pp. 6-46.

[8] Ellahi, R.M., Wood, L.C., Khan, M. & Alaa El-Din, A.B. 2025, "Integrity Challenges in Halal Meat Supply Chain: Potential Industry 4.0 Technologies as Catalysts for Resolution", *Foods,* vol. 14, no. 7, pp. 1135.

[9] Farooq, M.S., Qureshi, J.N., Ahmed, F., Momina, S. & Sameena, N. 2025, "Exploring a Blockchain-Empowered Framework for Enhancing the Distributed Agile Software Development Testing Life Cycle", *Inventions,* vol. 10, no. 4, pp. 49.

[10] Gong, X., Song, M., Wang, S., Jiao, R.J. & Helo, P. 2025, "Crowdsourced Manufacturing in Industry 4.0: Implications and Prospects", *Systems,* vol. 13, no. 3, pp. 183.

[11] Haibo, L. & Fabeil, N.F. 2024, "Factors influencing business model innovation of Chinese SMEs: A conceptual study", *Global Business and Management Research, suppl.Special Issue Theme: Creating A Sustainable Future: Powering Innovation and Accelerating Transformation,* vol. 16, no. 4, pp. 589-604.

[12] Haoqiang, Y. & Du, X. 2025, "Exploring the Mechanism of How the Market-Based Allocation of Data Elements Affects the Supply Chain Resilience of Manufacturing Enterprises: A Perspective on Data as a Production Factor", *Sustainability,* vol. 17, no. 17, pp. 7950.

[13] Hashem, G., Aboelmaged, M. & Ahmad, I. 2024, "Proactiveness, knowledge management capability and innovation ambidexterity: an empirical examination of digital supply chain adoption", *Management Decision,* vol. 62, no. 1, pp. 129-162.

[14] Hokmabadi, H., Seyed, M.H.S.R. & de Matos, C.A. 2024, "Business Resilience for Small and Medium Enterprises and Startups by Digital Transformation and the Role of Marketing Capabilities—A Systematic Review", *Systems,* vol. 12, no. 6, pp. 220.

[15] Jankowska, B., Götz, M., Mińska-Struzik, E. & Bartosik-Purgat, M. 2024, "A new wave and the ripples it makes: Post-transition firm's digital maturity and its consequences in global value chains", *Entrepreneurial Business and Economics Review,* vol. 12, no. 1, pp. 135-152.

[16] Kai-Fu, Y., Venkateswarlu, N., Chun-Cheng, L. & Long-Sheng, C. 2025, "Discovering Key Successful Factors of Mobile Advertisements Using Feature Selection Approaches", *Big Data and Cognitive Computing,* vol. 9, no. 5, pp. 119.

[17] Kargas, A., Gkika, E.C. & Sepetis, A. 2024, "Exploring Digital Transformation Intensity and Its Relationship with Sustainability: Greek Managers' Perspectives", *Sustainability,* vol. 16, no. 14, pp. 6077.
[18] Kontis Alexios-Patapios & Ioannidis Stelios A. K. 2025, "Metaverse Tourism: An Overview of Early Adopters' Drivers and Anticipated Value for End-Users", *Tourism and Hospitality,* vol. 6, no. 2, pp. 86.
[19] Kshetri, N. 2023, "Blockchain's Role in Enhancing Quality and Safety and Promoting Sustainability in the Food and Beverage Industry", *Sustainability,* vol. 15, no. 23, pp. 16223.
[20] Li, F., Hou, J., Yu, Y. & Yu, H. 2025, "Harnessing the digital transformation for manufacturing green development quality: new insights into the role of technological innovation heterogeneity", *Environmental Research Communications,* vol. 7, no. 6, pp. 065006.
[21] Li, J. & Wang, W. 2024, "From Renting Economy to Sharing Economy: How Do Bike-Sharing Platforms Grow in the Digital Era?", *Journal of the Knowledge Economy,* vol. 15, no. 2, pp. 8097-8117.
[22] Li, Q., Tian, W. & Zhang, H. 2025, "Digital Transformation for Sustainability in Industry 4.0: Alleviating the Corporate Digital Divide and Enhancing Supply Chain Collaboration", *Systems,* vol. 13, no. 2, pp. 123.
[23] Li, Z., Guo, F. & Du, Z. 2025, "Learning from Peers: How Peer Effects Reshape the Digital Value Chain in China?", *Journal of Theoretical and Applied Electronic Commerce Research,* vol. 20, no. 1, pp. 41.
[24] Liu, Z., Li, Z., Zhang, Y., Mutukumira, A.N., Feng, Y., Cui, Y., Wang, S., Wang, J. & Wang, S. 2024, "Comparing Business, Innovation, and Platform Ecosystems: A Systematic Review of the Literature", *Biomimetics,* vol. 9, no. 4, pp. 216.
[25] Liuwu, C. & Guimei, Z. 2025, "Exploring the Impact of Digital Inclusive Finance and Industrial Structure Upgrading on High-Quality Economic Development: Evidence from a Spatial Durbin Model", *Economies,* vol. 13, no. 8, pp. 212.
[26] Lobo, C.A., Arlindo, M., Santos, P.C., Azevedo Mónica & Moreira, F. 2025, "The Role of Leadership and Strategic Alliances in Innovation and Digital Transformation for Sustainable Entrepreneurial Ecosystems: A Comprehensive Analysis of the Existing Literature", *Sustainability,* vol. 17, no. 13, pp. 6182.
[27] Lukianykhina, O., Suprunenko, S., Slavkova, A., Skorba, O. & Zavrazhnyi, K. 2024, "Digital Innovations in the Fiscal Policy of Ukraine: Promoting Sustainable Economic Development", *International Journal of Economics and Financial Issues,* vol. 14, no. 4, pp. 77-86.
[28] Mihai Laurenţiu-Stelian, Sitnikov, V.V., Mirela, S., Vasilescu, L., Băndoi Anca, Sitnikov Cătălina & Leonardo-Geo, M. 2025, "A Bibliometric Analysis of the Role of Digitalization in Achieving Sustainability-Oriented Innovation", *Sustainability,* vol. 17, no. 13, pp. 5822.
[29] Mohammadsadegh, O., Confetto, M.G. & Palazzo, M. 2025, "Business Model Innovation: A Bridge Between Corporate Social Responsibility and Successful Performance for Medium-Size Enterprises (SMEs) in the Digital Era", *Systems,* vol. 13, no. 5, pp. 378.
[30] Mohammed, A. 2025, "Digital Transformation, Supply Chain Resilience, and Sustainability: A Comprehensive Review with Implications for Saudi Arabian Manufacturing", *Sustainability,* vol. 17, no. 10, pp. 4495.