



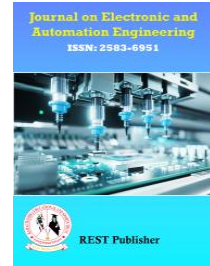
Journal on Electronic and Automation Engineering

Vol: 4(3), September 2025

REST Publisher; ISSN: 2583-6951 (Online)

Website: <https://restpublisher.com/journals/jae/>

DOI: <https://doi.org/10.46632/jae/4/3/5>



Opportunities For Use of Block Chain Technology in Medicine Using VIKOR Method

*Maheswaran Madhaiyan, M. Ramachandran, Ramya Sharma, Mydhili Senthil

REST Labs, Kaveripattinam, Krishnagiri, Tamil Nadu, India.

*Corresponding Author Email: maheswaranrsri03@gmail.com

Abstract: This paper critically analyzes the potential applications of block chain technology and smart contracts in supply chain management, focusing on their relevance to achieving sustainability objectives at both local and global levels. It highlights the influence of governmental policies, societal demands, and consumer pressures on supply chain sustainability. The discussion prompts further exploration into how a distributed ledger, facilitated by block chain technology, could offer solutions. Specifically, it proposes leveraging a block chain platform to digitally register transactions within the supply chain, thereby establishing a comprehensive database system. The decentralization of transactions occurs within the database of the supply chain, enhancing transparency, reliability, traceability, and efficiency in management. This innovative block chain-powered supply chain management system promotes environmental protection, social equality, and administrative efficiency. Its stability and performance in various fields make block chain technology a focal point of this article, emphasizing its role as a decentralized data base Supply Chain Management Systems involve the sharing of information among organizations to support analysis and planning activities. The asymmetry between institutions arises due to the lack of real data, which can disrupt the planning process. With the recent disruption in various industrial sectors, including the emergence of block chain technology, our research focuses on exploring issues in supply chains and implementing solutions using block chain technology to verify their application at every stage. A generalized framework concerning trust in relation to the creation and characteristics of decentralization has been thoroughly analyzed. This framework involves utilizing interval 2-tuple linguistic variables, comprising two linguistic terms and corresponding real numbers, to address personnel selection issues and effectively manage linguistic information in decision-making processes. The proposed Interval 2-Tuple Linguistics of the VIKOR Method offers a flexible and accurate approach. To illustrate its applicability and effectiveness, a numerical example involving tertiary care hospital staff is provided. This chapter emphasizes the value of intervals and discusses the integration of the VIKOR method with MCTM for problem-solving purposes. Initially, we prioritize the range by establishing the Neutron Sophia number, marking a departure. In this promotional procedure, we employ both the Analytical Hierarchy Process (AHP) technique and the VIKOR index for elimination. These methodologies serve distinct purposes; while AHP is geared towards determining magnitude through priority weighting, VIKOR excels in alternative ranking. Big Data Analytics is got the first rank whereas is the Cloud Computing is having the Lowest rank.

Keywords: Internet of Things (IoT), Artificial Intelligence (AI), Big Data Analytic, Smart Contracts and Cloud Computing.

1. INTRODUCTION

This paper explores block chain technology in the context of Supply Chain Management (SCM), examining existing literature, identifying trends, and highlighting its potential applications. It discusses the functions of block chain, including ensuring data integrity, facilitating prompt information sharing, and enabling programmable and automatic controls. Additionally, it discusses how block chain has the potential to disrupt traditional SCM processes by eliminating the need for intermediaries and streamlining manual processes [1]. Paper certificates and luxury items,

which often depend on receipts, can be easily lost or replaced. This applies to any object, especially high-value items. The lack of transparency in the supply chain can prevent both supply chain companies and customers from accurately assessing the true value of a product. This hinders proper verification and authentication processes. The expenses associated with intermediaries, their dependability, and the level of openness are factors that are being reevaluated due to an innovation in the supply chain. This development is adding complexity to its management. Consequently, challenges such as reliability, transparency, and strategic competition have emerged, impacting reputation management [2]. In the supply chain, particularly in terms of security, ensuring full transparency and detectability until the conclusion is crucial, especially for vital products. This underscores the significance of thorough oversight. Two months later, in June 2018, the spotlight turned to grocery supermarkets as the source of scrutinized goods sold. The electronic chain is a distributed ledger managed by a computer network, comprising users or participants. It consists of a series of entries, particularly known as block chains, which facilitate transaction processing and cryptographic validation [3]. A versatile supply chain aims to establish governance, with Block chain technology emerging as a crucial instrument. This technology integrates inventory management within the supply chain and seeks to enable real-time service operations through distribution and utilization of a decentralized ledger. It represents a novel approach, evident in its robust implementation. The application of Block chain in Supply Chain Management is conceptualized as having a significant impact, with literature emphasizing its central role in driving technological advancement [4]. Bitcoin, along with other cryptocurrencies, is poised to play a groundbreaking role in shaping the future of our society. The potential of this technology is sparking discussions among both the general public and professionals alike. Cryptocurrencies, including Bitcoin, are underpinned by block chain technology. This innovative system is at the forefront of the ongoing discourse regarding its myriad possibilities and implications [5]. In the realm of supply chain management, every organization tailors its cost structures, including profit margins and projections, based on local insights, strategically aiming to optimize its profitability. Consequently, each entity establishes operational objectives to align with its strategic vision. With the prevalence of shorter product life spans and extended production lead times, the challenge of accurate demand forecasting is on the rise. In a decentralized supply chain, the risk of excess capacity arises when there's either low demand perception or product unavailability. This lack of proper capacity risk sharing results in increased costs associated with capacity risk [6]. Many of these technological advancements, with block chain being particularly promising, emerged initially within the realm of Bitcoin. Furthermore, block chain technology encompasses a wide array of applications, making it a focal point of current research and discussions in various fields, as highlighted in contemporary publications. This study on Block chain-SCM integration offers valuable insights for both scholars and practitioners aiming to enhance their understanding and implementation of this innovative technology [7]. Block chain technology ensures the accuracy of stored records, originating from verifiable sources, and resistant to tampering or damage. It guarantees the existence of data by distributing copies across multiple parties instead of relying on a single entity, thereby creating a shared source of truth accessible to authorized participants. Collaborating with this information entails ensuring each individual possesses the most recent, precise, and dependable data. Utilizing this dataset instills assurance in its accuracy. Unlike traditional ledgers, which typically offer broad protection, this dataset, if compromised, exposes all stored information and grants unrestricted access to it [8]. SCM functionality involves managing high demand uncertainty, elevated supply risks, and escalating competitive pressures, all while being evaluated based on performance metrics. Block chain technology, on the other hand, operates as a decentralized ledger system, fostering transparency among participants and enabling direct peer-to-peer transactions without the need for intermediaries [9]. Block chain technology has stirred up considerable debate primarily due to its practical applications and the consequential shifts in business practices. Essentially, it operates as a decentralized digital ledger system, enabling secure and transparent recording of property transactions without reliance on traditional intermediaries like banks or governmental bodies. This technology functions through a peer-to-peer network, facilitating uncontrolled distribution of information across nodes [10]. Supply Chain Management (SCM) is a fundamental and indispensable operational procedure present in all modern organizations. It facilitates the coordination between customer demands and supplier connections through specialized processes. SCM encompasses various sub-processes and has undergone significant transformation over time due to technological advancements. These advancements have brought about substantial improvements in operations, delivery, and overall distribution procedures [11]. Each phase of the supply chain necessitates intricate operational data management, highlighting the need for robust data support. Processing, comprehending, and interpreting this information may encounter accuracy challenges. Additionally, the disposal of the product poses safety concerns. Implementing block chain technology can mitigate information-related obstacles, showcasing the potential of technology to offer solutions in this domain. Block chain technology offers a platform characterized by exploration, transparency, security, and precision. It enables intelligent execution while facilitating the removal of products,

thereby fostering informed decision-making. By integrating block chain technology into processes, recommendations, and administration, valuable insights are generated, empowering efficient product elimination decisions. [12]. During the implementation of a supply agreement, unforeseen market conditions or disruptions in the supply chain may arise, necessitating collaborative efforts from both parties to effectively address them. Mutual cooperation, as agreed upon by both partners, is essential in navigating such challenges and evaluating the outcomes of the supply chain partnership. If the contract is terminated, its renewal can be deliberated upon subsequently. After multiple extensions of the contract, partnerships are frequently evaluated strategically for potential collaboration. Such strategic partnerships not only prove to be more effective but also demonstrate potential for growth. Recently, in the digital commerce sector, there has been notable attention on BCT, which, in collaboration with supply chain partners, offers innovative technology solutions [13]. The emergence of block chain technology within logistics and supply chain management has sparked considerable enthusiasm. Its association with Bitcoin and its ability to ensure trust and reliability in transaction data have led to the development of a transparent ledger system. Initially recognized for its efficiency, supply chain managers are now exploring the myriad possibilities offered by this innovative technique. With increased visibility, there is a growing potential for enhanced transparency in supply chains. The timing of this technological advancement is opportune, as consumer demand for supply chain transparency continues to rise [14]. Each corporation operates on a global scale, navigating fiercely competitive markets with a minimal margin for dealing with rivals. They opt for well-coordinated and risk-aware strategies, favoring flexible supply chains. Currently, supply chain administrations involve every member coordinating and employing diverse techniques. The emphasis lies on enhancing efficiency across the entire supply chain, with recent efforts focusing on boosting accountability through the adoption of technology, marking one of the most notable transformations [15].

2. MATERIALS AND METHOD

Internet of Things (IoT): The term "Internet of Things" (IoT) refers to a system of interconnected devices operating within a collaborative network. This network encompasses both the devices themselves and the cloud infrastructure they interact with. IoT essentially involves the facilitation of technology that enables seamless communication between these interconnected devices and the cloud.

Artificial Intelligence (AI): Artificial Intelligence (AI) refers to computer systems capable of rational decision-making and problem-solving tasks, historically attributed solely to humans.

Big Data Analytics: Big Data Analytics involves leveraging vast volumes of raw data to uncover trends, patterns, and connections, facilitating data-informed decision-making. This process employs established statistical analysis techniques such as clustering and regression, alongside emerging tools tailored for handling extensive datasets.

Smart Contracts: Solidity is a programming language utilized predominantly for crafting smart contracts, primarily within the Ethereum ecosystem. Developed by key contributors to Ethereum, it serves as a fundamental tool for executing contracts on block chain platforms, particularly Ethereum.

Cloud Computing: Cloud computing, also known as cloud services, involves accessing information and applications stored remotely in virtual space. This allows organizations to store their files and run applications on remote servers, enabling users to access them via the internet from anywhere.

Transparency: Transparency is easily noticeable and apparent, whether in business or governance contexts. It entails clear visibility and honesty in operations.

Security: Monitoring systems, access control, and skilled security personnel are essential components of ensuring safety. Implementing measures such as personnel security and privacy protocols instill a feeling of security. These measures are crucial not only in public spaces and workplaces but also in residential areas, where they serve as effective deterrents against criminal activities, fostering a sense of safety among individuals.

Traceability: Monitoring the production chain and the appearance of components enables the identification, detection, and investigation of issues. This process facilitates the tracing of products across supply chains, particularly in industries such as food production and transportation. Monitoring food production has emerged as essential for ensuring food security in the food industry.

Efficiency: Efficiently achieving desired outcomes without expending unnecessary energy is the essence of productivity. This capacity to produce results is frequently attributed to proficiency, a trait applicable to both individuals and items. While humans and objects alike can possess this attribute, it extends beyond them to encompass machinery, systems, processes, and various entities commonly encountered in everyday endeavors.

VIKOR METHOD: In the current research, the case company has chosen VIKOR specifically for dynamic concept selection. Oprikovic and Zeng introduced the VIKOR method in a methodological study, emphasizing its linear nature and use of normalization. The scalar function evaluation achieved through the VIKOR method is independent of units, providing decision makers at the case company with a reliable means of assessing various agile criteria and selecting the most suitable ones for implementation [16]. Many scholars utilize fuzzy logic and linguistic values in their examination of staff selection samples, emphasizing tool-centric approaches as indicated by a literature review. The findings often illustrate that calculation outcomes tend to be intricate, owing to their imperfect alignment with elementary linguistic terms and the initial domain of expression. Therefore, the development of a process to approximate and convey results accurately becomes imperative [17]. The VIKOR approach facilitates decision-making by offering a balanced solution for problem-solving, incorporating feedback. Cheng-wen's superior water control strategies were employed by Chang and Hsu in utilizing the VIKOR method for partner selection in technology outsourcing projects, as suggested by Chen and Wang. This approach introduces clarity in partner selection through logical reasoning [18]. One significant challenge in development pertains to the comparison and evaluation of options using the VIKOR method, which can be paraphrased through the Analytic Hierarchy Process (AHP) method. This challenge involves assessing cooperation rankings in relation to the continuous index magnitude derived from rankings based on a reference [19]. Drawing upon an integrated multi-attribute methodology, the significance of maintaining computer components is evaluated using the AHP-VIKOR technique. This combined approach, traditionally utilized in the process industry, overcomes the limitations of conventional FMEA applications. It effectively identifies and ranks failure causes, underscoring its crucial role within the system under consideration [20]. Expanding its functionality to function effectively in uncertain circumstances, this study investigates the integration of the upgraded VIKOR technique within a decision support framework. Traditional VIKOR, rooted in the multi-criteria decision making (MCDM) paradigm, forms the basis for categorization explored in this work. Additionally, it delves into the utilization of an enhanced Fuzzy-VIKOR approach to address the supplier selection issue, thereby extending the analysis to encompass the VIKOR method [21]. In this paper, to address the shortcomings of VIKOR, a modified VIKOR model based on regret theory is proposed. The essence of this proposed model lies in its distinctive feature of evaluating regret levels, which are determined by comparing outcomes with standard references and other alternative measures. Additionally, to illustrate the effectiveness of the proposed model, comparisons are made with both VIKOR and regret-based decision-making through sample examples [22]. The VIKOR method in MCDM is unclear due to its application with alternative factors for assessing problem factors. VIKOR is characterized by its systematic approach and unique capability to handle conflicting criteria in multi-criteria problem solving. It primarily operates within alternative sets, concentrating on selecting the optimal alternative while also addressing conflicting criteria to reach a compromise solution for the problem at hand [23]. The variance in attribute weight data varies based on circumstances. In cases where only partial attribute weight information is available, a linear programming approach, Fair Weights Linguistics, is utilized. However, the interpretation of reluctant intuition remains ambiguous. To achieve a favorable ideal solution, each alternative's appraisal value is compared, aiming for maximum closeness to the intention of change [24]. The most pertinent standards for shaping a dynamic Integrated Management System (IMS) are the ISO standards and Global Reporting Initiative (GRI). This research will adhere to IMS guidelines when prioritizing policies for the first time. The outcomes of this research will benefit business managers, corporations, and policy makers by aiding in the decision-making process for enhancing sustainable business practices through the implementation of management standards [25]. The optimal logistic service provider is chosen using the VIKOR algorithm, with its weights determined by the ANP model as demonstrated in this study. A specific instance is illustrated, and its validity is confirmed through validation processes [26]. However, when it comes to mobile service assessment using the VIKOR method, prior research has produced conflicting results due to a lack of contextual consideration. The perception of mobile service quality varies among decision-makers based on linguistic attributes and individual preferences. Consequently, this issue presents uncertainty and must be addressed within an ambiguous environment [27]. The subsequent segments discuss the areas of uncertain Multiple Criteria Decision Making (MCDM) and vague VIKOR, along with their associated applications. The idea behind VIKOR, though ambiguous, is elucidated. Each step of the process is outlined. Following that, the first four online diabetes information providers are highlighted. A numerical illustration is presented, showcasing its application in any health-related domain. This method is employed to assess and rank information providers, demonstrating its utility in the realm of health information dissemination [28]. Copper and coal mines, as well as zinc mines, are generally considered safe despite being underground operations. However, they still pose risks due to the challenging working environments involved in underground mining [29]. The VIKOR

method offers a balanced solution that closely resembles an optimal one, considering the specified criteria for determining rank. It prioritizes compromise solutions that are closer to the ideal solution. Conversely, another approach for finding better solutions takes various factors into consideration [30].

3. ANALYSIS AND DISCUSSION

TABLE 1. Determination of best and worst value

	Transparency	Security	Traceability	Efficiency
Internet of Things (IoT)	20.615	17.083	45.062	25.036
Artificial Intelligence (AI)	26.348	15.965	56.532	23.632
Big Data Analytics	23.451	32.123	45.362	61.258
Smart Contracts	15.023	36.025	58.654	96.587
Cloud Computing	12.181	87.451	110.205	46.571
Best	12.181	87.451	110.205	23.632
Worst	26.348	15.965	45.062	96.587

Table 1 shows the Block Chain Technology in Supply Chain Management for VIKOR method. Transparency, Security, Traceability and Efficiency Evaluation. Internet of Things (IoT), Artificial Intelligence (AI), Big Data Analytics, Smart Contracts, Cloud Computing is the Best and Worst Value.

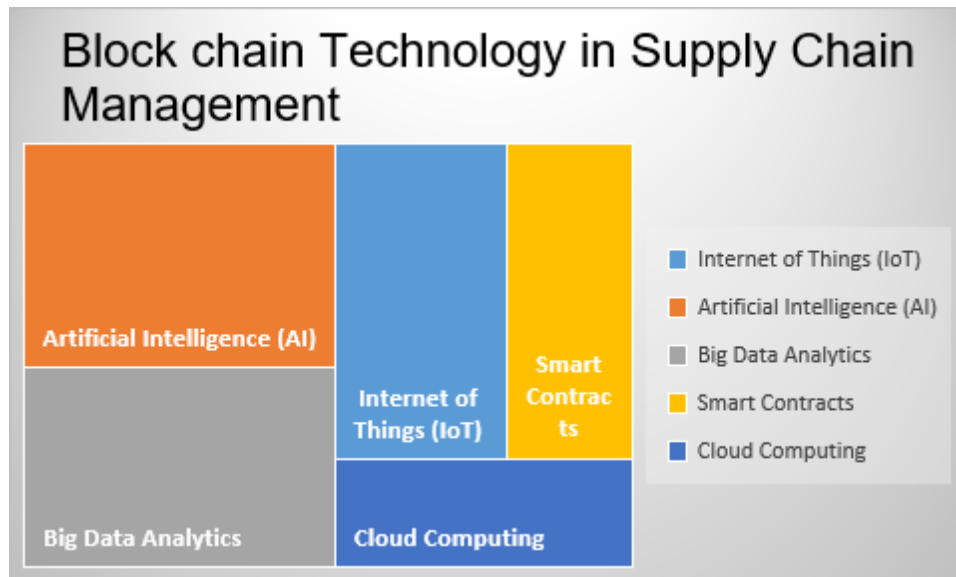


FIGURE 1. Determination of best and worst value of Block Chain Technology in Supply Chain Management

Figure 1 shows the Block Chain Technology in Supply Chain Management for VIKOR method. Internet of Things (IoT), Artificial Intelligence (AI), Big Data Analytics, Smart Contracts, Cloud Computing it is seen that Cloud Computing is showing the Best value for Transparency and Artificial Intelligence (AI) is showing the Worst value. Cloud Computing is showing the Best value for Security and Artificial Intelligence (AI) is showing the Worst value. Cloud Computing is showing the Best value for Traceability and Internet of Things (IoT) is showing the Worst value. Artificial Intelligence (AI) is showing the Best value for Efficiency and Smart Contracts is showing the Worst value.

TABLE 2. Calculation S_j and R_j

	Transparency	Security	Traceability	Efficiency	S _j	R _j
Internet of Things (IoT)	0.148832	0.24609	0.25	0.004811	0.649733	0.25
Artificial Intelligence (AI)	0.25	0.25	0.205981	0	0.705981	0.25
Big Data Analytics	0.198878	0.193492	0.248849	0.128936	0.770154	0.248849
Smart Contracts	0.050152	0.179846	0.197838	0.25	0.677836	0.25
Cloud Computing	0	0	0	0.078607	0.078607	0.078607

Table 2 shows the calculation S_j and R_j is the sum of Normalization of the tabulation 1 which is calculated from the Determination of best and worst value.

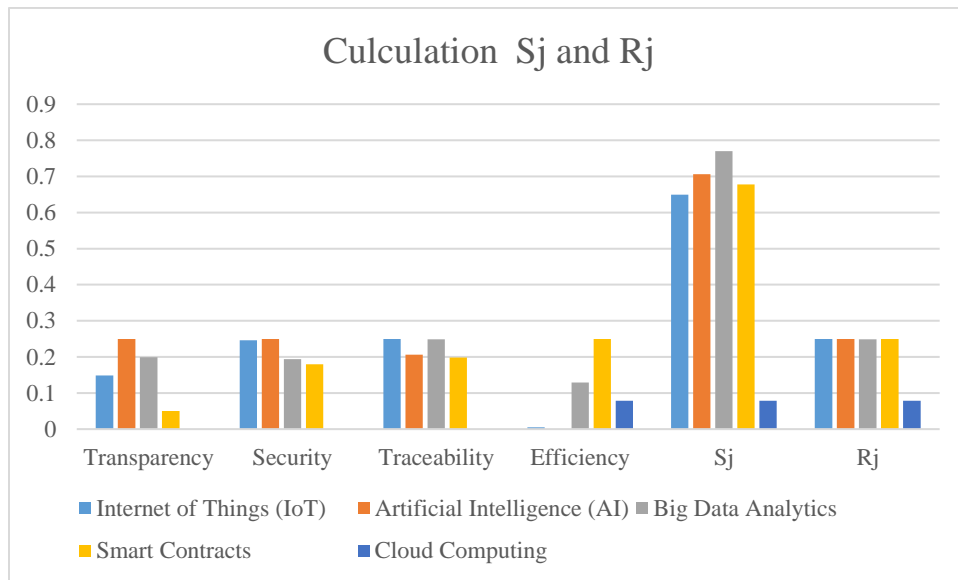


FIGURE 2. Calculation S_j, R_j

Figure 2 shows the calculation S_j and R_j is the sum of Normalization of the tabulation 1 which is calculated from the Determination of best and worst value.

TABLE 3. Final Result of Calculation Q_j

	S _j	R _j	Q _j	Rank
Internet of Things (IoT)	0.904544	0.649733	0.767877	4
Artificial Intelligence (AI)	0.955981	0.705981	0.835847	3
Big Data Analytics	1.147939	0.770154	0.984131	1
Smart Contracts	1.177836	0.677836	0.933252	2
Cloud Computing	0.23582	0.078607	0	5

Table 3 shows the Final Result of Calculation Q_j calculated from the sum of the calculation from the S_j and R_j from the Q_j value the rank is taken.

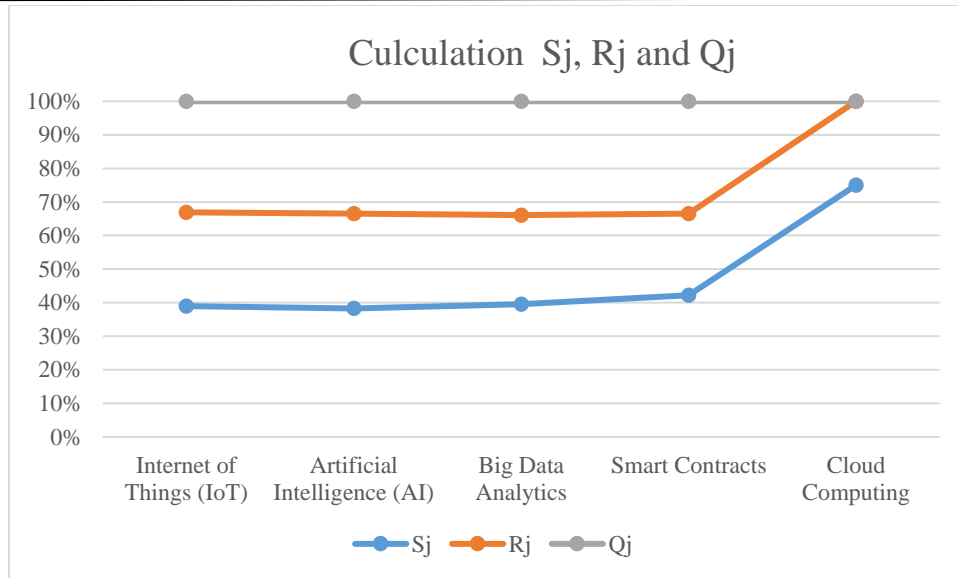


FIGURE 3. Calculation Sj, Rj and Qj

Figure 3 Shows the Calculation Sj, Rj and Qj Block Chain Technology in Supply Chain Management using VIKOR method. Qj for Big Data Analytics is showing the highest value and Cloud Computing is showing the lowest value.

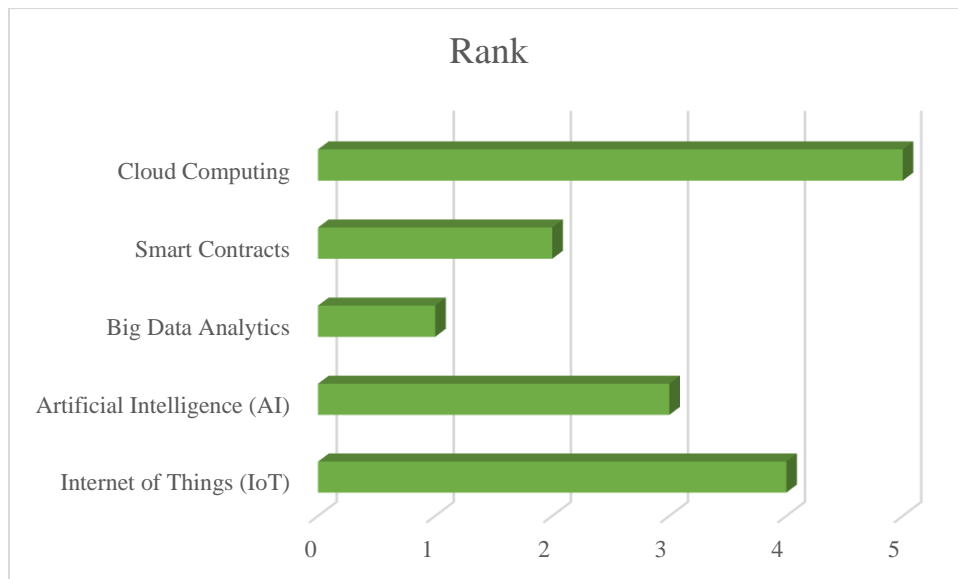


FIGURE 4. Shown the Rank

Figure 4 Shows the Rank of Block Chain Technology in Supply Chain Management for using the analysis of VIKOR Method. Big Data Analytics is got the first rank whereas is the Cloud Computing is having the Lowest rank.

4. CONCLUSION

It discusses the functions of block chain, including ensuring data integrity, facilitating prompt information sharing, and enabling programmable and automatic controls. Additionally, it discusses how block chain has the potential to

disrupt traditional SCM processes by eliminating the need for intermediaries and streamlining manual processes. It represents a novel approach, evident in its robust implementation. The application of Block chain in Supply Chain Management is conceptualized as having a significant impact, with literature emphasizing its central role in driving technological advancement. Consequently, each entity establishes operational objectives to align with its strategic vision. With the prevalence of shorter product life spans and extended production lead times, the challenge of accurate demand forecasting is on the rise. In a decentralized supply chain, the risk of excess capacity arises when there's either low demand perception or product unavailability. Additionally, the disposal of the product poses safety concerns. Implementing block chain technology can mitigate information-related obstacles, showcasing the potential of technology to offer solutions in this domain. Block chain technology offers a platform characterized by exploration, transparency, security, and precision. It enables intelligent execution while facilitating the removal of products, thereby fostering informed decision-making. Its association with Bitcoin and its ability to ensure trust and reliability in transaction data have led to the development of a transparent ledger system. Initially recognized for its efficiency, supply chain managers are now exploring the myriad possibilities offered by this innovative technique. With increased visibility, there is a growing potential for enhanced transparency in supply chains. The VIKOR approach facilitates decision-making by offering a balanced solution for problem-solving, incorporating feedback. Cheng-wen's superior water control strategies were employed by Chang and Hsu in utilizing the VIKOR method for partner selection in technology outsourcing projects, as suggested by Chen and Wang. Traditional VIKOR, rooted in the multi-criteria decision making (MCDM) paradigm, forms the basis for categorization explored in this work. Additionally, it delves into the utilization of an enhanced Fuzzy-VIKOR approach to address the supplier selection issue, thereby extending the analysis to encompass the VIKOR method. The idea behind VIKOR, though ambiguous, is elucidated. Each step of the process is outlined. Following that, the first four online diabetes information providers are highlighted. A numerical illustration is presented, showcasing its application in any health-related domain. This method is employed to assess and rank information providers, demonstrating its utility in the realm of health information dissemination. The VIKOR method offers a balanced solution that closely resembles an optimal one, considering the specified criteria for determining rank.

REFERENCES

- [1]. Gurtu, Amulya, and Jestin Johny. "Potential of blockchain technology in supply chain management: a literature review." *International Journal of Physical Distribution & Logistics Management* 49, no. 9 (2019): 881-900.
- [2]. Saberi, Sara, Mahtab Kouhizadeh, Joseph Sarkis, and Lejia Shen. "Blockchain technology and its relationships to sustainable supply chain management." *International journal of production research* 57, no. 7 (2019): 2117-2135.
- [3]. Banerjee, Deepak, Vinay Kukreja, Samir Rana, Manika Manwal, and Shanmugasundaram Hariharan. "Enhancing Snake Plant Disease Classification through CNN-Random Forest Integration." In *2023 International Conference on Research Methodologies in Knowledge Management, Artificial Intelligence and Telecommunication Engineering (RMKMATE)*, pp. 1-6. IEEE, 2023.
- [4]. Bhuyan, Hemanta Kumar, M. Saikiran, Murchhana Tripathy, and Vinayakumar Ravi. "Wide-ranging approach-based feature selection for classification." *Multimedia Tools and Applications* 82, no. 15 (2023): 23277-23304.
- [5]. Chandrasekar Raja, Devpriya Mani, M. Ramachandran, Nathiya Murali, "Evaluating Multimedia Technologies an EDAS-Based Analysis of Quality, Accessibility, Cost, and Energy Efficiency", *REST Journal on Data Analytics and Artificial Intelligence*, 4(3), September 2025, 24-34.
- [6]. Cole, Rosanna, Mark Stevenson, and James Aitken. "Blockchain technology: implications for operations and supply chain management." *Supply Chain Management: An International Journal* 24, no. 4 (2019): 469-483.
- [7]. Park, Arim, and Huan Li. "The effect of blockchain technology on supply chain sustainability performances." *Sustainability* 13, no. 4 (2021): 1726.
- [8]. Radanović, Igor, and Robert Likić. "Opportunities for use of blockchain technology in medicine." *Applied health economics and health policy* 16 (2018): 583-590.
- [9]. Nakasumi, Mitsuaki. "Information sharing for supply chain management based on block chain technology." In *2017 IEEE 19th conference on business informatics (CBI)*, vol. 1, pp. 140-149. IEEE, 2017.
- [10]. Peram, S. R. "Advanced Network Traffic Visualization and Anomaly Detection Using PCA-MDS Integration and Histogram Gradient Boosting Regression." *Journal of Artificial Intelligence and Machine Learning* 1, no. 3 (2023): 281.
- [11]. Queiroz, Maciel M., Renato Telles, and Silvia H. Bonilla. "Blockchain and supply chain management integration: a systematic review of the literature." *Supply chain management: An international journal* 25, no. 2 (2020): 241-254.
- [12]. Kawaguchi, Natsuki. "Application of blockchain to supply chain: Flexible blockchain technology." *Procedia Computer Science* 164 (2019): 143-148.

- [13]. Bhuyan, Hemanta Kumar, and Narendra Kumar Kamila. "Privacy preserving sub-feature selection based on fuzzy probabilities." *Cluster computing* 17, no. 4 (2014): 1383-1399.
- [14]. Peram, S. R. "Automated Label Detection and Recommendation System Using Deep Convolution Neural Networks and SPSS-Based Evaluation." *International Journal of Computer Science and Data Engineering* 1, no. 2 (2024): 258.
- [15]. Ramkumar, Thirunavukarasu, Shanmugasundaram Hariharan, and Shanmugam Selvamuthukumaran. "A survey on mining multiple data sources." *Wiley Interdisciplinary Reviews: Data Mining and Knowledge Discovery* 3, no. 1 (2013): 1-11.
- [16]. Praveen Kumar Kanumarlapudi, "Enhancing Generative AI Shopping Assistants through Advanced Multi-Attribute Decision Making Technique." *Journal of Artificial Intelligence and Machine Learning*, 3(2), (2025): 1-7. DOI: 10.55124/jaim.v3i2.267.
- [17]. Yousuf, Soha, and Davor Svetinovic. "Blockchain technology in supply chain management: Preliminary study." In 2019 sixth international conference on internet of things: systems, management and security (IOTSMS), pp. 537-538. IEEE, 2019.
- [18]. Min, Hokey. "Blockchain technology for enhancing supply chain resilience." *Business Horizons* 62, no. 1 (2019): 35-45.
- [19]. Banerjee, Arnab. "Blockchain technology: supply chain insights from ERP." In *Advances in computers*, vol. 111, pp. 69-98. Elsevier, 2018.
- [20]. Zhu, Qingyun, and Mahtab Kouhizadeh. "Blockchain technology, supply chain information, and strategic product deletion management." *IEEE Engineering Management Review* 47, no. 1 (2019): 36-44.
- [21]. Kim, Joon-Seok, and Nina Shin. "The impact of blockchain technology application on supply chain partnership and performance." *Sustainability* 11, no. 21 (2019): 6181.
- [22]. Hariharan, Shanmugasundaram, and Rengaramanujam Srinivasan. "A comparison of similarity measures for text documents." *Journal of Information & Knowledge Management* 7, no. 01 (2008): 1-8.
- [23]. Bhuyan, Hemanta Kumar, A. Vijayaraj, and Vinayakumar Ravi. "Development of secure images in image transferring system." *Multimedia Tools and Applications* 82, no. 5 (2023): 7529-7552.
- [24]. Kakulavaram, S. R. "Intelligent Healthcare Decisions Leveraging WASPAS for Transparent AI Applications." *Journal of Business Intelligence and Data Analytics* 1, no. 1 (2024): 1-7.
- [25]. Kanumarlapudi, P. K. "Improving Data Market Implementation Using Gray Relational Analysis in Decentralized Environments." *Journal of Artificial intelligence and Machine Learning* 2, no. 1 (2024): 1-7.
- [26]. Francisco, Kristoffer, and David Swanson. "The supply chain has no clothes: Technology adoption of blockchain for supply chain transparency." *Logistics* 2, no. 1 (2018): 2.
- [27]. Ghode, Dnyaneshwar J., Rakesh Jain, Gunjan Soni, Sunil K. Singh, and Vinod Yadav. "Architecture to enhance transparency in supply chain management using blockchain technology." *Procedia Manufacturing* 51 (2020): 1614-1620.
- [28]. Vinodh, S., Ashwin R. Varadharajan, and Abhishek Subramanian. "Application of fuzzy VIKOR for concept selection in an agile environment." *The International Journal of Advanced Manufacturing Technology* 65 (2013): 825-832.
- [29]. Liu, Hu-Chen, Jiang-Tao Qin, Ling-Xiang Mao, and Zhi-Ying Zhang. "Personnel selection using interval 2-tuple linguistic VIKOR method." *Human Factors and Ergonomics in Manufacturing & Service Industries* 25, no. 3 (2015): 370-384.
- [30]. Hussain, Syed Abou Itaf, Sankar Prasad Mondal, and Uttam Kumar Mandal. "VIKOR method for decision making problems in interval valued neutrosophic environment." *Fuzzy multi-criteria decision-making using neutrosophic sets* (2019): 587-602.
- [31]. Akmaludin, A., Astriana Mulyani, Budi Santoso, and Kudiantoro Widiyanto. "Position Based Job Promotion Using Multi-Criteria Elimination VIKOR Method." In *Journal of Physics: Conference Series*, vol. 1179, no. 1, p. 012013. IOP Publishing, 2019.
- [32]. Panwar, Nitin, Sanjeev Kumar, and Rajesh Attri. "AHP-VIKOR-based methodology for determining maintenance criticality." *International Journal of Productivity and Quality Management* 29, no. 2 (2020): 167-186.
- [33]. Sahu, Anoop Kumar, Saurav Datta, and S. S. Mahapatra. "Evaluation and selection of resilient suppliers in fuzzy environment: Exploration of fuzzy-VIKOR." *Benchmarking: An international journal* 23, no. 3 (2016): 651-673.
- [34]. Huang, Jih-Jeng, Gwo-Hsiung Tzeng, and Hsiang-Hsi Liu. "A revised VIKOR model for multiple criteria decision making- The perspective of regret theory." In *Cutting-Edge Research Topics on Multiple Criteria Decision Making: 20th International Conference, MCDM 2009, Chengdu/Jiuzhaigou, China, June 21-26, 2009*. Proceedings, pp. 761-768. Springer Berlin Heidelberg, 2009.
- [35]. Koppiahraj, K., S. Bathrinath, and S. Saravanasankar. "A fuzzy VIKOR approach for selection of ergonomic assessment method." *Materials Today: Proceedings* 45 (2021): 640-645.
- [36]. Banerjee, Deepak, Vinay Kukreja, Shanmugasundaram Hariharan, Vishal Jain, and Varun Jindal. "Predicting Tulip Leaf Diseases: A Integrated CNN and Random Forest Approach." In *2023 World Conference on Communication & Computing (WCONF)*, pp. 1-6. IEEE, 2023.
- [37]. Bhuyan, Hemanta Kumar, A. Vijayaraj, and Vinayakumar Ravi. "Diagnosis system for cancer disease using a single setting approach." *Multimedia Tools and Applications* 82, no. 30 (2023): 46241-46267.
- [38]. Yang, Wei, Yongfeng Pang, Jiarong Shi, and Chengjun Wang. "Linguistic hesitant intuitionistic fuzzy decision-making method based on VIKOR." *Neural Computing and Applications* 29 (2018): 613-626.
- [39]. Ikram, Muhammad, Qingyu Zhang, and Robert Sroufe. "Developing integrated management systems using an AHP-Fuzzy VIKOR approach." *Business Strategy and the Environment* 29, no. 6 (2020): 2265-2283.

- [40]. Lixin, Dai, Liu Ying, and Zhang Zhiguang. "Selection of logistics service provider based on analytic network process and VIKOR algorithm." In 2008 IEEE International Conference on Networking, Sensing and Control, pp. 1207-1210. IEEE, 2008.
- [41]. Suh, Yongyoon, Yongtae Park, and Daekook Kang. "Evaluating mobile services using integrated weighting approach and fuzzy VIKOR." Plos one 14, no. 6 (2019): e0217786.
- [42]. Afful-Dadzie, Eric, Stephen Nabareseh, Zuzana Komínková Oplatková, and Petr Klímek. "Model for assessing quality of online health information: A fuzzy VIKOR based method." Journal of Multi-Criteria Decision Analysis 23, no. 1-2 (2016): 49-62.
- [43]. Gul, Muhammet, M. Fatih Ak, and Ali Fuat Guneri. "Pythagorean fuzzy VIKOR-based approach for safety risk assessment in mine industry." Journal of Safety Research 69 (2019): 135-153.
- [44]. Sharma, Ruchi, Ritu Sibal, and Sangeeta Sabharwal. "Software vulnerability prioritization: A comparative study using TOPSIS and VIKOR techniques." System performance and management analytics (2019): 405-418.
- [45]. Hariharan, Shanmugasundaram, and Rengaramanujam Srinivasan. "Studies on graph based approaches for single and multi document summarizations." International Journal of Computer Theory and Engineering 1, no. 5 (2009): 1793-8201.
- [46]. Bhuyan, Hemanta Kumar, Vinayakumar Ravi, and M. Srikanth Yadav. "Multi-objective optimization-based privacy in data mining." Cluster computing 25, no. 6 (2022): 4275-4287.
- [47]. Kakulavaram, Sridhar. "Life Insurance Customer Prediction and Sustainability Analysis Using Machine Learning Techniques." International Journal of Intelligent Systems and Applications in Engineering 10 (2022).