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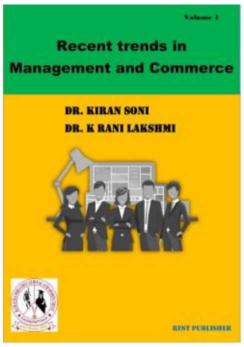

The Application of Blockchain Technology in E-government in India Using Additive Ratio Assessment System (ARAS) Method

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Abstract. *In order to compile all pertinent research on Blockchain technology, we carried out a methodical mapping investigation for this study. Our goal is to comprehend the present research areas, challenges, and future directions in relation to Blockchain technology from a technical standpoint. Even though many of the recommended remedies haven't had their effectiveness empirically demonstrated, the majority of the studies concentrate on uncovering and resolving Bitcoin protocol privacy and security vulnerabilities. Many further scaling-related issues, including as throughput and latency, remain unresearched. It's one of the first scientific, participant papers that offers a thorough analysis of blockchain programmed and initiatives in the energy sector, far as we are aware. To create a map of the promise and feasibility of blockchain systems in the energy industry, our study uses their data to analyse 140 bitcoin research studies and start-up firms. They typically use various measurement units and take a different approach to optimization. The normalization seeks to produce ranges of criteria values that are similar. In this study, a brand-new "Additive Ratio Assessment (ARAS)" technique is presented. An actual case study of the evaluation of the microenvironment in offices is offered to show the ARAS method as it is stated. The case study seeks to ascertain the internal environment of the workplace and to specify the actions that need be made to enhance it. The alternatives are Consensus determination, read permission, Immutability, Efficiency, Centralized and Consensus process. The evaluation parameters are Public blockchain, Consortium blockchain and Private blockchain. Block chain technology for Additive Ratio Assessment method. Immutability is got the first rank whereas Read permission is got lowest value of rank.*

Keywords: *Biological Collections, Ship Hull, MOORA method*

1. INTRODUCTION

Blockchain is inspiring optimism and a level of buzz unheard of in the science world. It is hailed as a brand-new technical revolution that will affect society at least as significantly as the development of the wheels, the steam power, or the Internet. Because it forms the backbone of how cryptocurrencies function, blockchain technology is inextricably linked to cryptocurrencies, but these are two distinct concepts. Among other places, blockchain technology is used in logistics networks and in hospitals. The quality of the smartphone's production plan is enhanced by the usage of this technology. The benefits and drawbacks of blockchain technology are discussed in this essay. Decentralized networks, transparency, reliable chains, immutable technology, and indestructible technologies are some of blockchain technology's key benefits. The key drawbacks of blockchain, on the other hand, are its low efficiency, challenging integration procedure, and expensive installation. The ARAS technique is based on the claim that straightforward relative comparisons can be used to comprehend complex events. The claim makes it possible to compare the sum of the accepted as the norm and weighted criteria scores, which characterize the alternative being considered, to the total sum of the relatively stable and weighted criteria, which also describe the optimized alternative, in order to determine the level of optimization problem achieved by the replacement under comparison. According to the ARAS technique, the utility function characterizing the complex relative effectiveness of a reasonable alternative is roughly equivalent to the perceived significance of the numbers and imbalances of the key criteria considered in a project.

2. BLOCK CHAIN TECHNOLOGY

Blockchain technology is built on a method that lets previously anonymous users build and maintain nearly any dataset cooperatively and in a fully decentralized manner, with transactions integrity and completion being certified by multiple verifiers through consensus. The idea for blockchain - based first appeared in the research on cryptographically secure chains of blocks that was published in 1991. Merkle trees, which enable many papers to be grouped into a block, were considered in the design in 1992. When the Bit white paper was released in 2008 by an individual going by the pseudonym Satoshi Nakamoto, blockchain technology became significant. Improving supply chain visibility, security, sustainability, and process integrity will help solve these complex issues. Blockchain technology may provide the solution to this issue (blockchain). Thanks to recent findings and applications that run on the public blockchain concept, these improvement targets are now more technologically, organizationally, and financially feasible. technology behind blockchain, which has the potential to be disruptive and resembles a decentralized, "trustless" database, enables disintermediation and decentralization of many parties' processes and transactions on a worldwide scale. Bitcoin's core technology is blockchain technology. The transactional information for Bitcoin is kept on the block - chain, a distributed ledger [55]. To be precise, the first, biggest, and most popular blockchain is Bitcoin itself. Since that time, blockchain technology has increasingly disconnected from the Bitcoin network and evolved into a global underpinning that can handle distributed accounting features. Blockchain technology does not rely solely central authority because it is built as a decentralized peer-to-peer network. To spread transactions and blocks, it makes use of a broadcast network. Using nodes, it broadcasts messages throughout a network. The blockchain is replicated on each node and is synchronized with all other nodes. The cryptocurrencies network relies on complex algorithms, concurrency control, including the blockchain's proof - of - work (PoW) and the Nxt cable network blockchain's proof of stake (PoS), to safeguard the blockchain against attacks. No node knows a priori which iteration of the ledger is authentic. See research by [21] for a quick summary of the two primary consensus techniques, PoS and PoW. Much attention has been paid to the advancement of blockchains and the potential benefits it may offer in the context of the distribution of funds across corporate networks. However, there are many issues with blockchain technology, including its potential and future ability to accomplish the production speed required for an autonomous computer house, to lower costs when compared to the traditional payment methods, to contain the growth of wasted rare minerals when increased transaction quantities will be involved.

3. MATERIALS AND METHOD

The ARAS technique, a comparatively recent tool for MCDM, has recently attracted a lot of interest. It continues to be predicated on the notion that intricate occurrences outside the world may be precisely recognized by straightforward relative comparisons [101–103]. The ARAS technique determines a ranking by using the idea of optimality degree. It is the sum of the normalized weightings of the criteria for each alternative divided by the sum of the best alternative's normalized weighted values. Turskis and Zavadskas introduced and created the "Additive Ratio Assessment (ARAS) method. Comparing the ARAS approach to other MADM algorithms reveals several striking advantages. The Pareto best solution, an alternate that is represented by ideal indicator values, is compared to each alternative in order to determine the utility of each one. A better alternative for any criterion cannot be selected by the decision-maker. By including or excluding non-Pareto optimum solutions, the decision maker will produce nice utopian options with equal ranking (rank reversal resistant). The ARAS-F and ARAS-G methods, which expand the basic ARAS method to fuzzy and grey numbers, respectively. The ARAS approach is also applied to successfully resolve real-world decision-making issues. They created a brand-new ARAS methodology to assess the microclimate in workplace spaces. They developed a multi-criteria evaluation system based on ARAS to look into ways to cut greenhouse gas emissions. Additionally, the ARAS approach was expanded to encompass A new MCGDM model and interval-valued hesitant fuzzy fuzzy sets were developed to evaluate the supplier selection process as part of a digital supply chain.

TABLE 1. Block chain Technology Using ARAS Method

	Public blockchain	Consortium blockchain	Private blockchain	**C**
Maxor Min	81.8	75.9	83.2	4.315
Consensus determination	73.7	75.9	58.9	8.342
Read permission	69.6	48.4	60.3	6.171
Immutability	81.8	70.6	83.2	7.119
Efficiency	54.5	55.1	70.5	6.283
Centralized	51.9	69.7	70.6	8.128
Consensus process	80.2	74.97	20.8	4.315

shows the table 1 Block chain Technology Using ARAS Method. The alternatives are Consensus determination, read permission, Immutability, Efficiency, Centralized, Consensus process. The evaluation parameter is Public blockchain, Consortium blockchain and Private blockchain Normalized matrix values

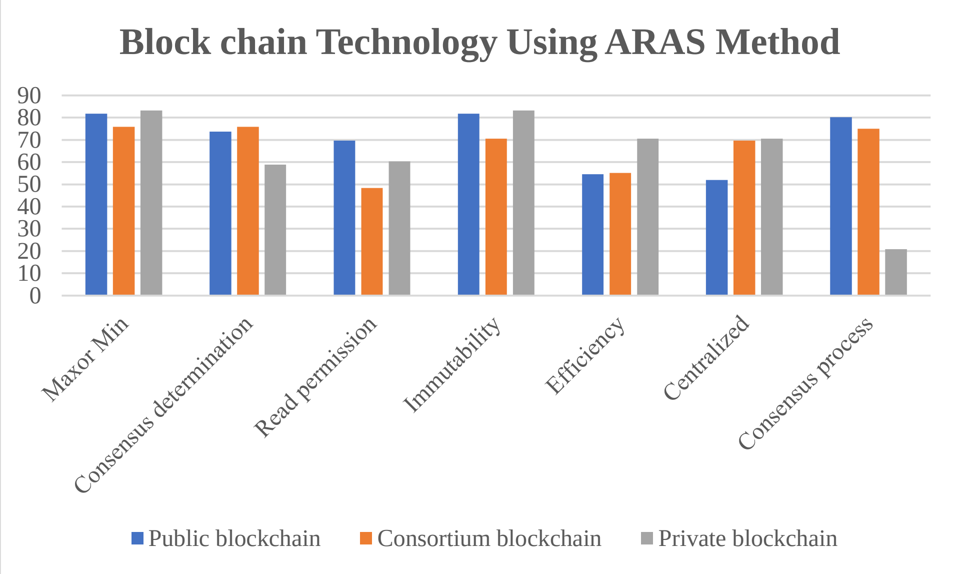

FIGURE 1. Block chain Technology Using ARAS Method

Figure 1 shows the Block chain Technology Using ARAS Method. The alternatives are Consensus determination, read permission, Immutability, Efficiency, Centralized, Consensus process. The evaluation parameter is Public blockchain, Consortium blockchain and Private blockchain Normalized matrix values.

TABLE 2. Calculation of maximum value

	Public blockchain	Consortium blockchain	Private blockchain	C
Maxor Min	81.8	75.9	83.2	0.23174971
Consensus determination	73.7	75.9	58.9	0.11987533
Read permission	69.6	48.4	60.3	0.16204829
Immutability	81.8	70.6	83.2	0.140469167
Efficiency	54.5	55.1	70.5	0.159159637
Centralized	51.9	69.7	70.6	0.123031496
Consensus process	80.2	74.97	20.8	0.23174971
	493.5	470.57	447.5	1.168083341

Table 2 shows the Calculation of maximum value block chain technology Consensus determination, read permission, Immutability, Efficiency, Centralized, Consensus process Public blockchain, Consortium blockchain and Private blockchain calculation of maximum values are derived by using the formula (1).

TABLE 3. Normalized Matrix

	Public blockchain	Consortium blockchain	Private blockchain	**C**
Maxor Min	0.165755	0.161294	0.185922	0.198402
Consensus determination	0.149341	0.161294	0.13162	0.102626
Read permission	0.141033	0.102854	0.134749	0.13873
Immutability	0.165755	0.150031	0.185922	0.120256
Efficiency	0.110436	0.117092	0.157542	0.136257
Centralized	0.105167	0.148118	0.157765	0.105328
Consensus process	0.162513	0.159317	0.04648	0.198402

Table 3 shows the normalized matrix for block chain technology in Additive Ratio Assessment method. to Consensus determination, read permission, Immutability, Efficiency, Centralized, Consensus process Public blockchain, Consortium blockchain and Private blockchain Normalized matrix values are derived by using the formula (2).

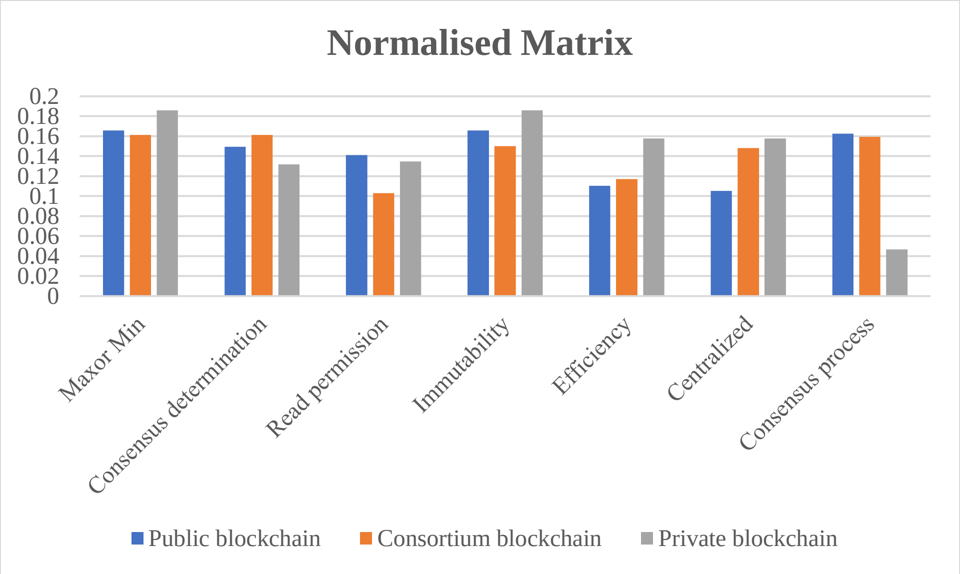

FIGURE 2. Normalized matrix

Shows the figure 2 normalized matrix for Block Chain Technology in Additive Ratio Assessment method. to Consensus determination, read permission, Immutability, Efficiency, Centralized, Consensus process Public blockchain, Consortium blockchain and Private blockchain Normalized matrix values.

TABLE 4. Weighted Normalized Matrix

	Public blockchain	Consortium blockchain	Private blockchain	**C**
	0.21	0.18	0.22	0.15
Maxor Min	0.034809	0.029033	0.040903	0.02976
Consensus determination	0.031362	0.029033	0.028956	0.015394
Read permission	0.029617	0.018514	0.029645	0.02081
Immutability	0.034809	0.027006	0.040903	0.018038
Efficiency	0.023191	0.021077	0.034659	0.020439
Centralized	0.022085	0.026661	0.034708	0.015799
Consensus process	0.034128	0.028677	0.010226	0.02976

Table 4 shows the weighed normalized matrix for the Block Chain Technology in the addition rate rating system. It also shows Consensus determination, read permission, Immutability, Efficiency, Centralized, Consensus process Public blockchain, Consortium blockchain and Private blockchain Weighted normalized matrix values are derived by using the formula (3).

TABLE 5. Si, Ki and Rank

	Si	**Ki**	**Rank**
Maxor Min	0.134504	1	
Consensus determination	0.104745	0.778746	2
Read permission	0.098585	0.732949	6
Immutability	0.120755	0.897779	1
Efficiency	0.099366	0.738755	4
Centralized	0.099254	0.737923	5
Consensus process	0.102791	0.764218	3

Table 5 shows the final result and rank of the Block Chain Technology in Additive Ratio Assessment method. And it shows the SI, KI, Rank. SI values are derived by using the formula (4), And KI values are derived by using the formula(5).

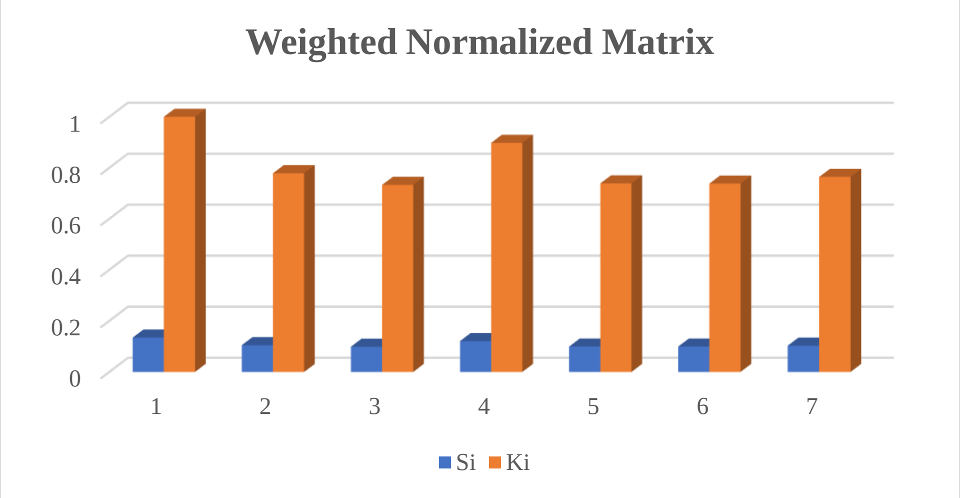

FIGURE 3. Weighted normalized matrix

Figure 3 shows the weighted normalized matrix in Block chain technology. As shown in figure 3, In SI method Immutability is showing the highest value and Centralized is showing the lowest value for KI method Immutability is showing the highest value and Efficiency is showing the lowest value of weighted normalized data.

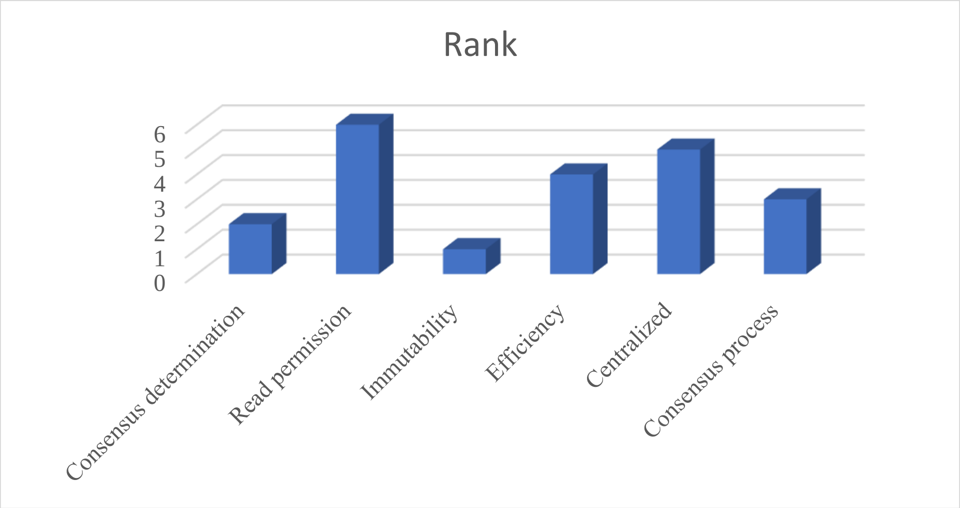

FIGURE 4. Block chain Technology ranking Using ARAS Method

Shows the figure 4 Rank Block chain technology for Additive Ratio Assessment method. Immutability is showing the first value of rank whereas Read permission is showing the lowest value of rank.

4. CONCLUSION

Blockchain technology underpins the cryptocurrency known as Bitcoin. All activities are processed on a shared database that is accessible to everyone in the decentralized environment. Every Blockchain user should be able to preserve their accountability, security, privacy, and secrecy. These characteristics, however, result in a variety of technological obstacles and constraints that must be surmounted. We begin by providing a succinct introduction of blockchain technologies, along with details on its structure and distinguishing features. The common bitcoin algorithms are then covered. Different aspects of these regimens were looked at and contrasted. Additionally, we outlined certain obstacles and issues that may limit blockchain growth and outlined some current methods for resolving these issues. This study has contributed to the solution of this issue. The application of the "AHP, ARAS, and MCGP" methods to the difficulties of selecting catering suppliers is the main topic of this research. The meal and addressed immediately are the 2 most important factors, according to the results of the first step, which involved using AHP to find the percentage criteria weights based on the expert and director's subjective assessments from the case scenario. Second, the ARAS approach was used to assign a weight to each alternative caterer's performance relative to each criterion, and S4 was chosen as the top caterer. The Block chain technology for Additive Ratio Assessment method. Immutability is showing the first value of rank whereas Read permission is showing the lowest value of rank.

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