Environmental Impact Assessment United States of India Using GRA Method

* **Sangeetha Rajkumar, M. Ramachandran, Vimala Saravanan, Prabakaran Nanjundan**
REST Labs, Kaveripattinam, Krishnagiri, Tamil Nadu, India.
Corresponding author Email: Haritharajkumar04@gmail.com

Abstract: *An environmental impact assessment examines a project's potential effects on the environment while taking into consideration natural, social, and economic factors. More than half of the nations in the world require EIA in some capacity. EIAs had much less of an impact than their initial supporters anticipated. This study institutionalizes the difference, offers methodological justifications, and suggests approaches for future EIA use that will be more successful. Extensive knowledge of environmental impact assessments (EIA) as a tool for management of the ecosystem in the future Its goals and level of success have sparked a lot of discussion. It is evaluated based on the "Performance" of EIA. In particular, the debate shifts away from issues of actual implementation and toward the most crucial EIA objectives and their placement in broader decision-making contexts. EIA's implementation of planning choices is generally weak. Empirical research has supported the effect. The goal of this paper is to address Scale weights concern COPRAS interval-valued integers. The COPRAS method is extended to MCDM issues with unknowable knowledge. It essentially establishes some optimization models based on the traditional COPRAS method's fundamental concept, the determination of scale weights. This alternative in this method has been adopted by Delhi, Ladakh, Jammu and Kashmir, Andaman and Nicobar, Chandigarh, Lakshadweep, and the assessment criteria are Terrestrial, Aquatic, Economic, Social, and Cultural, as well as Air, Water, Soil, Noise, and Solid Waste pollution. As a result of this research Principles of the GRA technique uses the short-range and negative-best solutions to calculate the long-range answer, but the comparison of these distances is not thought to be important. Delhi has therefore been given the top ranking; Ladakh has received a poor ranking. This study demonstrates Delhi's elevated levels of air pollution.*
Key words: *environmental impact assessment, ARAS method.*

1. INTRODUCTION

Before significant decisions and commitments are made, According to the International Association for Impact Assessment (IAIA), 1999, an environmental impact assessment, or EIA, is the method of recognizing, foreseeing, assessing, and reducing the effects of biological, social, and other relevant development plans. Before development can begin, it is crucial to ensure that all potential repercussions are thoroughly comprehended and taken into account. EIA aids in giving environmental considerations the weight they deserve when planning applications are taken into account, along with economic or social factors. It will be advantageous to everyone engaged in the planning process if properly implemented. Environmental impact assessments give planning authorities and other public entities responsible for the environment a foundation for more informed decision-making. Over the previous 60 years, environmental impact assessments (EIA) It has grown to be a crucial component of environmental control. Consistent with an understanding of its scope and effects, human activity-induced natural change has a particular nature. Due to the changing needs of decision-makers, EIA has subsequently evolved, changed, as well as been affected by knowledge of the method of decision-making and practice at the time. Significant effects on individuals and communities at a moment when it is crucial as ever to look at the effects of systems involving Studying the environment and making advancement are both beneficial. This article is divided into two sections as a result.Brief descriptions of the EIA's history, current state of use, and formats for emerging impacts are provided in the first section. EIA's Dealing with the Current Situation and Shaping the Future of EIA is the second section. Before drawing any generalizations about the future, consider how recent trends in regional EIA have been reflected in theoretical development, practice, and performance. When assessing the potential effects of a large project, environmental impact assessments (EIAs) can have a substantial impact on the environment. (or other action). It is a reasonable idea to consider before deciding whether or not to give permission to proceed. It thinks about the results It is an official procedure. The EIA report should be published and among its other requirements is to describe any

possible significant impacts. Consult this evaluation Public involvement is also crucial. The primary and most immediate objective of EIA is to educate decision-makers about the potential environmental impacts of their decisions as an immediate consequence of these activities. It is justifiable if it promotes development. (To do this, EIA offers mechanisms for resolving negative impacts, revising development plans as required. Although some proposals were dropped as a result of the EIA, this goal remains a significant point of emphasis.) In addition to these, EIA has a sustainability strategy.As it becomes more integrated into the larger context, its originality rediscovers its initial purpose and helps to promote sustainable development patterns. Hence the origin of this essay EIA It attempts to reflect on the extent of its activity and impact in the context of its founding goals. How much EIA has been institutionalized in various nations around the globe to address this issue, EIA reform was integrated to accomplish its fundamental goals. This makes it a great opportunity for you to think about how you can help. EIA's beginnings and The article starts by outlining its guiding principles, discussing how it came to be enacted into law, and specifically mentioning the problem of EIA performance and the extent of its influence on the development plan. Review of research findings.Lastly, to increase the efficiency of EIA methods Possibilities are taken into consideration, particularly in relation to its most crucial goals, and it is asserted that methods of enhancing EIA's influence in development planning should be pursued.

Making decisions about environmental issues is complicated and multifaceted due to the inherent compromises between sociopolitical, environment, ecological, and economic considerations. Additionally, distinct stakeholders with various priorities and objectives may be involved in environmental decisions. Numerous variables, such as the power source the distribution of costs and benefits, the environmental effects on various groups, safety, ecological risk, or individual values, are usually taken into thought when choosing appropriate remedial methods for polluted sites, land use planning, and regulatory methods.Practical strategies that have been created as a result of intensive research in the area of multicriteria decision-making can be used to apply scientific decision-theoretic approaches to complex multicriteria problems. a few of the MCDM techniques that is commonly applied to environmental decision-making problems is the COPRAS method. Environmental assessments frequently involve concepts that are difficult to describe and include both qualitative and quantitative elements. EIA is a complicated topic due to its extensive scope as well as the variety of attributes it evaluates. Depending on the breadth, an evaluation may result in ambiguous and subjective conclusions that could have an impact on various interest groups or stakeholders, each of whom has different requirements and demands. Given these challenges, logic-based approaches are preferable when conducting challenging assessment processes. The COPRAS technique was created to convey phrases used in the decision-making process in order to handle the ambiguity, fuzzyness, and subjectivity of human judgment. The COPRAS methods are particularly useful for dealing with complex and ill-defined environmental decision-making issues.

2. WOVEN GFR/EPOXY COMPOSITES

Future environmental impact assessments (EIA) will be a practice. EIA decision-makers can benefit greatly from much of the labor-intensive work required. investigates alternative futures and information distribution networks. Of course, a thorough examination of prior developments is necessary to develop knowledge of cause and effect, which will be applied in future evaluations. Furthermore, environmental impact predictions are empirically supported to be reliable for the present, so ideally they will begin to be implemented. All choices, though, are based on unclear future options. Regarding possible environmental impacts of alternative development strategies Impact analysts are by definition susceptible to manipulative thought processes because EIA's goal is to educate decision makers. EIA is an evaluation of how human actions affect the environment. It is an analysis and assessment of impacts procedure. Its goal is to ensure sustainable development while also protecting the environment and societal welfare. EIA has demonstrated to be a valuable tool for environmental planning and management. A strategy, project, or other action that alters the world as a result of human activity The use of characteristics is one of its uses, Additionally, because its members make decisions, the affected community should be alerted in preparation. Take part in the procedure. EIA is a preventative technology that is essential to tying ideas together and ensures consistency in decision-making, which is the primary goal of development. Institutional context for the adoption and application of EIA in a nation or area and, obviously, that relies on the political climate. Its use dominates impact evaluation practice on a global scale at the project level. Major projects are given extra attention. Sadly, despite the aforementioned factors, all nations intend to introduce a development control act. This could have a big effect on the environment, so proposed projects need to use EIA frequently. The World Bank Group partly fills this gap and provides funding recommendations for vital initiatives in developing nations. Developed safety policies with processes for social and environmental assessment. However, as main program funding from the World Bank Group significantly decreased in the 1990s, the Bank's safeguards, including EIA arrangements Without conducting environmental and social assessments, many large-scale projects are moving forward, which made it obvious that there was a danger of neglect. They receive money from other sources. Private company's financial institutions and international lending institutions - when they make their own financial decisions, the answer is to urge other major

donors to follow similar environmental and social evaluation requirements. EIA is a procedure that gives decision-makers a finished result that illustrates the potential effects of their choices. In other terms, an EIA evaluates how a planned activity will affect the environment. It is an important, potential tool for environmental control. The focus of the international discussion is on its growth to satisfy the demands of participatory, integrated, and the difficulties of sustainable growth, and making decisions that are based on science. A significant amount of MCDM research has been done on EIA-related topics. Using a decision analysis interview method, Marttunen and Hamalainen (1995) assessed the environmental impacts of two freshwater development projects. In 1998, Spengler, Geldermann, Hahre, Siever dingbeck, and Rentz developed a multi-criteria decision assistance system for the environmental assessment of recycling operations in the iron and concrete manufacturing sector.The ARAS system is complex World events simplified using relative comparisons It is based on the argument that it can be understood. Normalized and of weighted scales for sum of values, It is under consideration Describes an alternative. These criteria are optimal and describe the degree of optimality, This is achieved by substitution in comparison. Most useful and from rated To select the actual alternative, The best alternative is artificially created. Analyzed real From the xi indicator data of AI Alternatives Modeling the best alternative. While doing calculations, Alternative ais better The alternative is compared to a0. Calculation process Taking into account, Optimum function ~ Sivalues of the studied parameters xij and weights ω~ j and their corresponding in the final result Live with influence and has a proportional relationship. Therefore, the value of the optimal function ~ Si, A very useful alternative. Priorities of alternatives can be determined according to the value of Si. Because of this, When using this method, Evaluate decision alternatives Ranking is convenient.

3. MECHANISM AND CONTROL SURFACES

Economic disturbance (C1): Disturbances in living quality, land use and development, and economic activity are all included in the assessment of economic disturbance. Social disturbance (C2): Social disturbance takes into account community disconnection, accessibility to public amenities and transit, and other factors. This criterion also considers the landscapes and cultural artifacts that the area's industrial development has destroyed. Air pollution (C3): The assessment of emissions of carbon monoxide, sulfur dioxide, nitrogen dioxide, and total suspended particles is referred to as air pollution. (TSP). Water pollution (C4): Determining the levels of dissolved oxygen, biochemical oxygen demand, suspended solids, and ammonia nitrogen in surface and ground water constitutes the assessment of water pollution. The term "soil pollution" (C5) refers to chemical residues in the form of liquid and gas in the soil. Noise pollution (C6): A noise pollution assessment detects noise and vibration produced by construction machinery. Solid waste pollution (C7): The solid waste evaluation implies garbage and industrial waste from building sites. Ecological alteration (C8): An evaluation of ecological alteration consists of determining the level of risk presented by threats to the survival of terrestrial and aquatic animals, plants, and other endangered species. Four experts assess six development projects in accordance with India's six industrialized states using the eight EIA criteria mentioned above.

TABLE 1. Alternative

A1	Ladakh
A2	Delhi
A3	Jammu and Kashmir
A4	Andaman and Nicobar
A5	Lakshadweep
A6	Chandigarh

Table 1 show that the United States of India, Delhi, Ladakh, Jammu and Kashmir, Andaman and Nicobar, Chandigarh and Lakshadweep are alternatives.

TABLE 2. Evaluation parameters

C1	Economic disturbance
C2	Social disturbance
C3	Air pollution
C4	Water pollution
C5	Soil pollution
C6	Noise pollution
C7	Solid waste pollution
C8	Ecological alteration

Table 2 shown that the several of Economic disturbance is C1, Social disturbanceis C2, Air pollution is C3, Water pollution is C4, Soil pollution is C5, Noise pollution is C6, Solid waste pollution is C7, and Ecological alteration is C8 are evaluation parameters.

TABLE 3. Data set

	C1	C2	C3	C4	C5	C6	C7	C8
A1	23.24	27.42	17.42	39.53	15.42	29.15	22.05	43.12
A2	29.12	39.40	12.46	42.97	58.43	33.69	27.30	42.13
A3	43.12	35.42	24.08	22.58	36.12	26.13	22.13	45.43
A4	34.75	27.43	25.16	28.28	32.14	28.73	24.13	23.10
A5	28.13	33.33	27.12	36.41	43.12	19.43	29.43	17.59
A6	23.14	29.43	31.08	25.12	48.15	18.43	27.13	18.89

Table 3 shown that the several of data set for Ladakh, Delhi, Jammu and Kashmir, Andaman and Nicobar, Chandigarh, Lakshadweep. The values are given above the tabulation. These data set shown values about union Pradesh effect pollution. Figure 1 is show in data set graph.
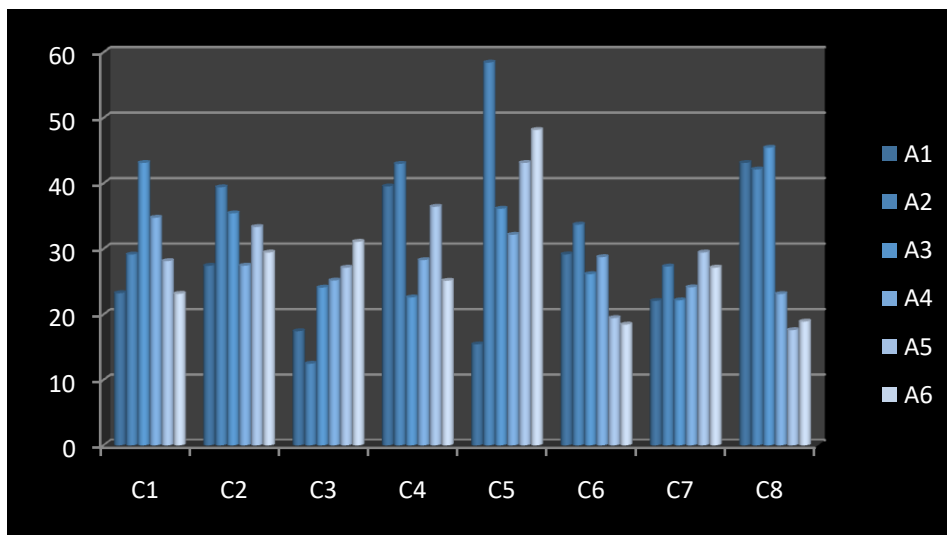

FIGURE 1. Data set graph.

Figure 1 is shows the several of graph for Ladakh, Delhi, Jammu and Kashmir, Andaman and Nicobar, Chandigarh, Lakshadweep.

TABLE 4. maximum value

	C1	C2	C3	C4	C5	C6	C7	C8
Max	43.12	39.4	31.08	42.97	58.43	33.69	29.43	45.43
A1	23.24	27.42	17.42	39.53	15.42	29.15	22.05	43.12
A2	29.12	39.4	12.46	42.97	58.43	33.69	27.3	42.13
A3	43.12	35.42	24.08	22.58	36.12	26.13	22.13	45.43
A4	34.75	27.43	25.16	28.28	32.14	28.73	24.13	23.1
A5	28.13	33.33	27.12	36.41	43.12	19.43	29.43	17.59
A6	23.14	29.43	31.08	25.12	48.15	18.43	27.13	18.89

Table 4 calculated for maximum value for data set C1 maximum value is 43.12, C2 maximum value is 39.40, C3 maximum value is31.08, C4 maximum value is42.97, C5 maximum value is58.43, C6 maximum value is 33.69,C7 maximum value is29.43 and C8 maximum value is 45.43.

TABLE 5. normalized for data set

	C1	C2	C3	C4	C5	C6	C7	C8
Max	0.191969	0.169952	0.184561	0.180652	0.200233	0.115452	0.100853	0.155683
A1	0.103464	0.118276	0.103444	0.16619	0.052843	0.154029	0.121421	0.182952
A2	0.129641	0.169952	0.07399	0.180652	0.200233	0.178018	0.15033	0.178752
A3	0.191969	0.152784	0.142993	0.09493	0.123779	0.138071	0.121861	0.192753
A4	0.154706	0.118319	0.149406	0.118893	0.11014	0.15181	0.132874	0.09801
A5	0.125234	0.143769	0.161045	0.153073	0.147767	0.102668	0.162059	0.074632
A6	0.103018	0.126946	0.184561	0.105608	0.165005	0.097384	0.149394	0.080148

Table 5 Data for analysis are transformed into normalized data. In which all values are less than 1. This makes the analysis easier. A weight age value of 0.125 is taken for all the data to get the weighted normalized matrix.

TABLE 6. Weighted Normalized Matrix

	C1	C2	C3	C4	C5	C6	C7	C8
Max	**0.023996**	**0.021244**	**0.02307**	**0.022582**	**0.025029**	**0.014431**	**0.012607**	**0.01946**
A1	0.012933	0.014785	0.012931	0.020774	0.006605	0.019254	0.015178	0.022869
A2	0.016205	0.021244	0.009249	0.022582	0.025029	0.022252	0.018791	0.022344
A3	0.023996	0.019098	0.017874	0.011866	0.015472	0.017259	0.015233	0.024094
A4	0.019338	0.01479	0.018676	0.014862	0.013768	0.018976	0.016609	0.012251
A5	0.015654	0.017971	0.020131	0.019134	0.018471	0.012834	0.020257	0.009329
A6	0.012877	0.015868	0.02307	0.013201	0.020626	0.012173	0.018674	0.010018

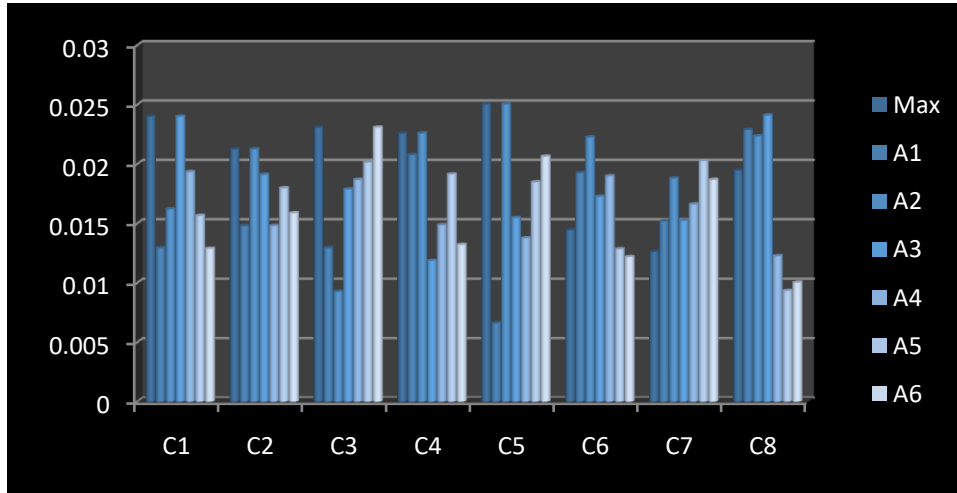Weighted Normalized Matrix is obtained in Table 6. With this we can get sum of value.

FIGURE 2. Weighted Normalized Matrix

TABLE 7. Si and Ki value

	Si	Ki
Max	0.162419	1
A1	0.125327	0.771628
A2	0.157696	0.97092
A3	0.144893	0.892089
A4	0.12927	0.795902
A5	0.133781	0.823676
A6	0.126508	0.778898

From table 7 sum of value is obtained and Ki value is obtained. Ki value is obtained by dividing Si Max value. This can be seen in Figure 3.
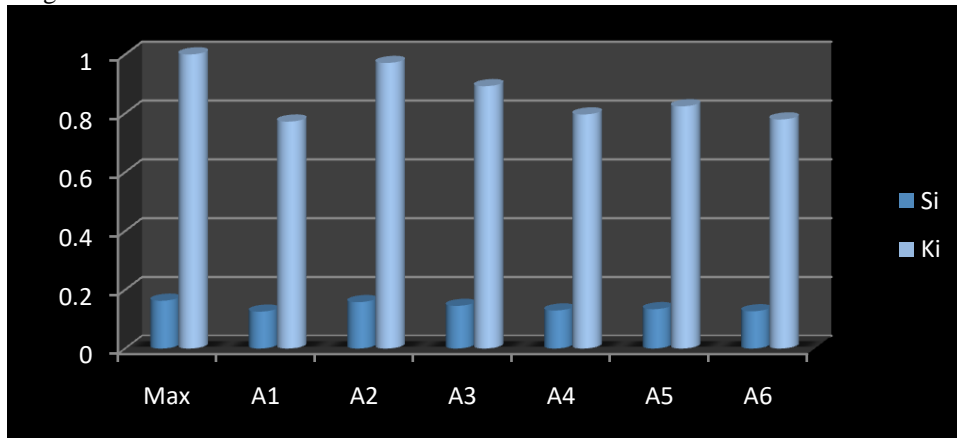

FIGURE 3. graph for Si and Ki value

Table 8. Ranking

A1	ladakh	6
A2	Delhi	1
A3	Jammu and Kashmir	2
A4	Andaman and Nicobar	4
A5	Lakshadweep	3
A6	Chandigarh	5

The ranking is obtained from Table 8. It is not multiplied by Table 7. In this, Delhi is the sixth rank, Delhi is the first rank, Jammu and Kashmir is the second rank, Andaman and Nicobar is the fourth rank, Lakshadweep is the third rank and Chandigarh is the last fifth.
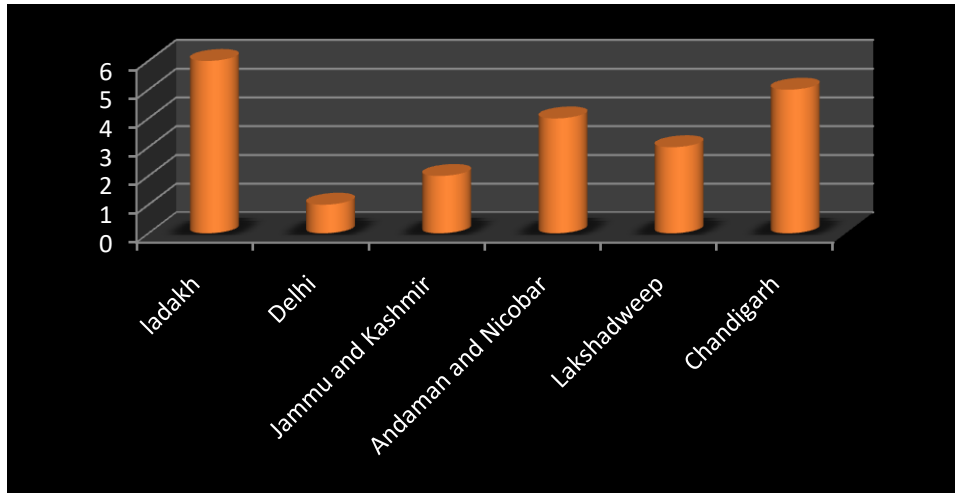
FIGURE 4. Ranking

4. CONCLUSION

Considering social, political, economic, and environmental variables all at once, determine the environmental effects of development initiatives by anticipating and assessing EIA, which serves as the foundation for better decision-making. Everyone engaged in the planning process will gain if it is carried out successfully. Different sizes, various input parameters, comparable accuracy in the absence of data, and qualitative and subjective variables are all included. Taking environmental concerns into consideration can be challenging. The idea behind MCDM packages for managing fuzzy statistics is frequently the closest to reality. Integrated into Urban Industrial Planning Context Using the MCDM methodology this study's goal is to suggest an EIA approach. In the suggested system, the GRA process is used to create the criterion weights. Different urban industrial districts favor using MCDM over GRA to evaluate environmental effect. According to the results, Ladakh received the lowest ranking, while Delhi received the top spot. This study demonstrates Delhi's elevated levels of air pollution.

REFERENCES

[1]. Morgan, Richard K. "Environmental impact assessment: the state of the art." *Impact assessment and project appraisal* 30, no. 1 (2012): 5-14.

[2]. Ortolano, Leonard, and Anne Shepherd. "Environmental impact assessment: challenges and opportunities." *Impact assessment* 13, no. 1 (1995): 3-30.

[3]. K. R. Chandru, D. S. Robinson Smart, M. Ramachandran, Chinnasami Sivaji. "Integrating the Digital Twin of Decision Support Systems in Aeronautics." REST Journal on Advances in Mechanical Engineering 2(2),(2023):12-23. DOI: https://doi.org/10.46632/jame/2/2/3

[4]. Stewart-Oaten, Allan, William W. Murdoch, and Keith R. Parker. "Environmental impact assessment:" Pseudoreplication" in time?." *Ecology* 67, no. 4 (1986): 929-940.

[5]. Jay, Stephen, Carys Jones, Paul Slinn, and Christopher Wood. "Environmental impact assessment: Retrospect and prospect." *Environmental impact assessment review* 27, no. 4 (2007): 287-300.

[6]. Steinemann, Anne. "Improving alternatives for environmental impact assessment." *Environmental Impact Assessment Review* 21, no. 1 (2001): 3-21.

[7]. Treweek, Jo. "Ecology and environmental impact assessment." *Journal of applied ecology* (1996): 191-199.

[8]. Joao, Elsa. "How scale affects environmental impact assessment." *Environmental impact assessment review* 22, no. 4 (2002): 289-310.

[9]. Toro, Javier, Ignacio Requena, and Montserrat Zamorano. "Environmental impact assessment in Colombia: Critical analysis and proposals for improvement." *Environmental Impact Assessment Review* 30, no. 4 (2010): 247-261.

[10]. Ramanathan, R. "A note on the use of the analytic hierarchy process for environmental impact assessment." *Journal of environmental management* 63, no. 1 (2001): 27-35.

[11]. Lawrence, David P. "Planning theories and environmental impact assessment." *Environmental impact assessment review* 20, no. 6 (2000): 607-625.

[12]. Balaguru S, Vela Murali & Chellapandi P 2016, „Measurement of the Residual Stresses and Investigation of Their Effects on a Hard faced Grid Plate due to Thermal Cycling in a Pool Type Sodium-Cooled Fast Reactor", Science and Technology of Nuclear Installations (ISSN: 1687-6083), vol. 2016, pp. 1-8. https://doi.org/10.1155/2016/8353256

[13]. Cashmore, Matthew. "The role of science in environmental impact assessment: process and procedure versus purpose in the development of theory." *Environmental Impact Assessment Review* 24, no. 4 (2004): 403-426.

[14]. Balaguru S, Vela Murali&Chellapandi P 2017, „Effects of different Operating Temperatures on the Tensile Properties of the Grid Plate Hard faced with Colmonoy in a Pool Type Sodium-Cooled Fast Reactor", Science and Technology of Nuclear Installations (ISSN: 1687-6083), vol. 2017, pp. 1-9. https://doi.org/10.1155/2017/5926105

[15]. Duinker, Peter N., and Lorne A. Greig. "Scenario analysis in environmental impact assessment: Improving explorations of the future." *Environmental impact assessment review* 27, no. 3 (2007): 206-219.

[16]. S. Siva Shankar, Vimala Saravanan, M. Ramachandran, R. Sangeetha, "Network based Intrusion Detection System using the SPSS Method", REST Journal on Data Analytics and Artificial Intelligence, 2(1), (2023):82-92. DOI: https://doi.org/10.46632/jdaai/2/1/13

[17]. Toro, Javier, Ignacio Requena, Oscar Duarte, and Montserrat Zamorano. "A qualitative method proposal to improve environmental impact assessment." *Environmental Impact Assessment Review* 43 (2013): 9-20.

[18]. Glucker, Anne N., Peter PJ Driessen, Arend Kolhoff, and Hens AC Runhaar. "Public participation in environmental impact assessment: why, who and how?." *Environmental impact assessment review* 43 (2013): 104-111.

[19]. Rosenberg, David M., H. V. Danks, and Dennis M. Lehmkuhl. "Importance of insects in environmental impact assessment." *Environmental management* 10, no. 6 (1986): 773-783.

[20]. Stewart-Oaten, Allan, and James R. Bence. "Temporal and spatial variation in environmental impact assessment." *Ecological monographs* 71, no. 2 (2001): 305-339.

[21]. Balaguru S, Deenadayalan, K, Vela Murali&Chellapandi, P 2014, „Influence of welding speed over dilution for Circular Grid Plate Hardfaced with Colmonoy-5", Applied Mechanics and Materials (ISSN: 1662-7482), vol. 565, pp. 53-58. doi:10.4028/www.scientific.net/AMM.565.53

[22]. Zavadskas, Edmundas Kazimieras, and Zenonas Turskis. "A new additive ratio assessment (ARAS) method in multicriteria decision-making." *Technological and economic development of economy* 16, no. 2 (2010): 159-172.

[23]. Zavadskas, Edmundas Kazimieras, Zenonas Turskis, and Tatjana Vilutiene. "Multiple criteria analysis of foundation instalment alternatives by applying Additive Ratio Assessment (ARAS) method." *Archives of civil and mechanical engineering* 10, no. 3 (2010): 123-141.

[24]. Shankar, S. Siva, and A. Rengarajan. "Data hiding in encrypted images using Arnold transform." *ICTACT J. Image Video Process* 7, no. 01 (2016).

[25]. S. Siva Shankar, Vimala Saravanan, M. Ramachandran, R. Sangeetha, "A Tutorial on Optimization Automated Tracking Wireless Network System in SPSS Method", REST Journal on Data Analytics and Artificial Intelligence, 2(2), (2023):100-108. DOI: https://doi.org/10.46632/jdaai/2/2/14

[26]. Krishna Kumar TP, M. Ramachandran, Kurinjimalar Ramu, Ashwini Murugan. "Using this DEMATEL Corporate social responsibility CSR." REST Journal on Banking, Accounting and Business 2(1) (2023):51-59. DOI: https://doi.org/10.46632/jbab/2/1/10

[27]. Sekaran, S. Chandra, V. Saravanan, R. RudraKalyanNayak, and S. Siva Shankar. "Human health and velocity aware network selection scheme for WLAN/WiMAX integrated networks with QoS." *International Journal of Innovative Technology and Exploring Engineering (IJITEE), ISSN* (2019): 2278-3075.

[28]. Manjunath, C. R., Ketan Rathor, Nandini Kulkarni, Prashant Pandurang Patil, Manoj S. Patil, and Jasdeep Singh. "Cloud Based DDOS Attack Detection Using Machine Learning Architectures: Understanding the Potential for Scientific Applications." *International Journal of Intelligent Systems and Applications in Engineering* 10, no. 2s (2022): 268-271.

[29]. Ghenai, Chaouki, Mona Albawab, and Maamar Bettayeb. "Sustainability indicators for renewable energy systems using multi-criteria decision-making model and extended SWARA/ARAS hybrid method." *Renewable Energy* 146 (2020): 580-597.

[30]. M. Mamatha, M. Ramchandran, Kurinjimalar Ramu, "Influence of Chemical Treatment of Natural Fibres Using the SPSS Method", Journal on Materials and its Characterization 2(1), March 2023, 28-39.

[31]. Stanujkic, Dragisa, and Rodoljub Jovanovic. "Measuring a quality of faculty website using ARAS method." In *Proceeding of the International Scientific Conference Contemporary Issues in Business, Management and Education*, vol. 545, p. 554. 2012.

[32]. Palanimuthu, Kogila, Eshetu Fikadu Hamba Yigazu, Gemechu Gelalcha, Yirgalem Bekele, Getachew Birhanu, and Birhanu Gutu. "Assessment of Stress, Fear, Anxiety and Depression on COVID-19 Outbreak among Adults in South-Western Ethiopia." *Prof.(Dr) RK Sharma* 21, no. 1 (2021): 440.

[33]. Rathor, Ketan, Anshul Mandawat, Kartik A. Pandya, Bhanu Teja, Falak Khan, and Zoheib Tufail Khan. "Management of Shipment Content using Novel Practices of Supply Chain Management and Big Data Analytics." In *2022 International Conference on Augmented Intelligence and Sustainable Systems (ICAISS)*, pp. 884-887. IEEE, 2022.

[34]. Shankar, S. Siva, and A. Rengarajan. "Puzzle based highly secure steganography." In *2017 International Conference on Algorithms, Methodology, Models and Applications in Emerging Technologies (ICAMMAET)*, pp. 1-5. IEEE, 2017.

[35]. Balaguru S, Vela Murali&Chellapandi P 2015, „Effects of Welding speeds on Macro and Microstructures in Hard facing of Colmonoy on Un-grooved and Grooved 316 L(N) SS Base metal‟, International Journal of Applied Engineering Research (ISSN 0973-9769), vol. 10, pp. 25627-25631.

[36]. Kumar, Ashish, Ketan Rathor, Snehit Vaddi, Devanshi Patel, Preethi Vanjarapu, and Manichandra Maddi. "ECG Based Early Heart Attack Prediction Using Neural Networks." In *2022 3rd International Conference on Electronics and Sustainable Communication Systems (ICESC)*, pp. 1080-1083. IEEE, 2022.

[37]. Nayak, Rudra Kalyan, Ramamani Tripathy, V. Saravanan, Priti Das, and Dinesh Kumar Anguraj. "A Novel Strategy for Prediction of Cellular Cholesterol Signature Motif from G Protein-Coupled Receptors based on Rough Set and FCM Algorithm." In *2020 Fourth International Conference on Computing Methodologies and Communication (ICCMC)*, pp. 285-289. IEEE, 2020.

[38]. Aswini, S., S. Tharaniya, R. J. Joey Persul, B. Avinash Lingam, and P. Kogila. "Assessment of Knowledge, Attitude and Practice on Immunization among Primi Mothers of Children." *Indian Journal of Public Health Research & Development* 11, no. 3 (2020).

[39]. Kutut, Vladislavas, E. K. Zavadskas, and M. Lazauskas. "Assessment of priority alternatives for preservation of historic buildings using model based on ARAS and AHP methods." *Archives of civil and mechanical engineering* 14, no. 2 (2014): 287-294.

[40]. Rathor, Ketan, Sushant Lenka, Kartik A. Pandya, B. S. Gokulakrishna, Susheel Sriram Ananthan, and Zoheib Tufail Khan. "A Detailed View on industrial Safety and Health Analytics using Machine Learning Hybrid Ensemble Techniques." In *2022 International Conference on Edge Computing and Applications (ICECAA)*, pp. 1166-1169. IEEE, 2022.

[41]. Tasisa, Yirgalem Bekele, and Kogila Palanimuthu. "Psychosocial Impacts of Imprisonment among Youth Offenders in Correctional Administration Center, Kellem Wollega Zone, Ethiopia." *Medico-legal Update* 21, no. 2 (2021).

[42]. Suresh Kumar, S., Martin Margala, S. Siva Shankar, and Prasun Chakrabarti. "A novel weight-optimized LSTM for dynamic pricing solutions in e-commerce platforms based on customer buying behaviour." *Soft Computing* (2023): 1-13.

[43]. Gutu, Birhanu, Genene Legese, Nigussie Fikadu, Birhanu Kumela, Firafan Shuma, Wakgari Mosisa, Zelalem Regassa et al. "Assessment of preventive behavior and associated factors towards COVID-19 in Qellam Wallaga Zone, Oromia, Ethiopia: A community-based cross-sectional study." *PloS one* 16, no. 4 (2021): e0251062.

[44]. Balaguru S, Vela Murali&Chellapandi P &Manoj Gupta 2020, Effect of Dilution on Micro Hardness of Ni-Cr-B-Si alloy Hardfaced on Austenitic Stainless Steel plate, Nuclear Engineering and Technology (ISSN: 1738-5733), vol. 52, pp. 589-596. https://doi.org/10.1016/j.net.2019.08.011

[45]. Palanimuthu, Kogila. "Birhanu Gutu, Leta Tesfaye, BuliYohannis Tasisa, Yoseph Shiferaw Belayneh, Melkamu Tamiru, and Desalegn Shiferaw." Assessment of Awareness on COVID-19 among Adults by Using an Online Platform: 26 Countries View."." *Medico-legal Update* 21.

[46]. Rathor, Ketan, Keyur Patil, Mandiga Sahasra Sai Tarun, Shashwat Nikam, Devanshi Patel, and Sasanapuri Ranjit. "A Novel and Efficient Method to Detect the Face Coverings to Ensurethe Safety using Comparison Analysis." In *2022 International Conference on Edge Computing and Applications (ICECAA)*, pp. 1664-1667. IEEE, 2022.

[47]. Liu, Nana, and Zeshui Xu. "An overview of ARAS method: Theory development, application extension, and future challenge." *International Journal of Intelligent Systems* 36, no. 7 (2021): 3524-3565.