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A Review on Multi-Criteria Decision-Making and Its Application

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Abstract

Capable of Multi-Scale Decision Making (MCDM), it improves all areas of decision-making engineering from design production, but is also highly applicable to applications in high-tech market areas. Very small gains in material performance. The full potential of MCDM systems is realized by performance, while complex material selection considers the material, process and form of the problems. Therefore, it is necessary to expand the range of MCDM methods to conceptualize experience in developing a wide range of engineering applications and material selection. It is important to deal with and deal with uncertainty in order to effectively address current practical design issues and data controls, as well as product selection and effective application of MCDM. Design. Products with highly advanced materials and designed properties, especially composites and so on Functional materials are a significant part of starting to use MCDM. With the current emphasis on material design and modeling, it is desirable to incorporate a wide range of analytical capabilities into future versions of computer simulation software.

Keywords: Multi-Criteria Decision-Making, Decision Making, VIKOR, Analytic Hierarchy Process

Introduction

MCDM is the process of determining the best solution to problems that are criteria that commonly occur in everyday life. Decision making is the selective process of finding a decision, gathering information, and Evaluating alternative outcomes. Using a step-by-step decision-making process is more about Organizing relevant information and defining alternatives. Deliberately, think and help make decisions. VIKOR stands for "Serbian Optimization and Compromise Solution". It has been adapted to information sources with various formats. His Ph.D. D. developed the basic ideas of VIKOR in the research paper and published an application. Multiple criteria Decision Making (MCDM) or Multi-Scale Analysis Analysis (MCDA) is a subdivision of functional research that explicitly evaluates many conflicting criteria in decision making (in everyday life and in organizations such as business, government and medicine). Multigriteria analysis generally allows for a comparative and mathematical tool that combines different alternatives or scenarios. Compares by criteria, often contradicts, and performs complex analyzes and analyzes systematically Results using a mathematical and psychoanalytic hierarchical process (AHP). Developed by Thomas L ... Provides AHP with a rational framework for the desired effect by measuring its criteria and alternative options, and how to relate those components to the overall goal. Analytic Hierarchy, commonly known as AHP is a powerful and simple way to make decisions. V It is commonly used for project priority and selection.Your strategy as a set of weight criteria AHP helps to achieve goals.

Multi-Criteria Decision-Making

[60] ANP is the most common form of AHP. Therefore, the results of the assessment obtained by ANP are close to the actual practice. ANP was used for MCDM to provide controls of the hierarchical structure. It was used for project selection product planning, strategic decision making and optimal planning. ANP is strong, and this kind The advantage of ANP over the complex MCDM The problem is, it converts to quantitative and standard data types Not only that, it is interdependent and overcomes the problem of feedback. between criteria. ANP method (1) The following three to evaluate the decision-making problem Steps include network hierarchical structure; (2) calculating the weight of the factors at each step; And (3) calculate the weight of the entire hierarchical structure. [67] The next step in resolving the supplier rating issue is to follow the WASPAS AL upgrade. Section 2.3 introduces the structure and step-by-step process of WASPAS. First, a normal decision panel is required. To obtain the default result matrix, equations 7 and 8 Should be used for both advantages and disadvantages. For this job, all conditions are other benefits His pride and consumption of resources were estimated at the Battle of Sirteria. shows the default result matrix. After that, the weight should reach the default supplier matrix. As mentioned earlier, in the WASPAS algorithm, the weighed default result panel is made up of two concepts of the MCDM - the weighed sum method and the weighed method. Those formulas become equations 7 and 8 Have been introduced. The weighted default supplier matrix is in the picture. [4] The formation of multiple criteria results, as described, is directly characterized by a set of multiple criteria. Many refined MCDM Methods have been developed, and the quality and The amount of additional information they need, the method of use, the user-friendliness, the sensitivity tools used and so on differ from each other in the mathematical properties they verify. Vinke briefly outlines the overall separation of several criterion Diversity application theory results in three components: transient modes and interactive modes. The multi-criterion

results presented a study of the history and recent status of support organizations. Wang et al. Many dimensions of the consistency goal And due to the complexity of socio-economic and biophysical systems, MCDM methods have become increasingly popular in sustainability decision making. [5] The processes of the hybrid MCDM model are summarized shown in Figure 1. The objectives of combining these methods for evaluating factor analysis, DEMATEL method, ambiguous measurement, ambiguous integration, AHP method and e-learning performance will be explained as follows. Excluded MCDM methods, ambiguous measurement and ambiguous integration, Pro was used to assess the multi-dimensional problem. [6] This paper proposes a MCDM-based way to deal with assessing grouping results monetary danger investigation. Test review to assess the way to deal with assessing six grouping calculations, eleven right sizes and three MCDM strategies Selects (see Figure 1). This segment gives data on the proposed assessment approach, grouping calculations, execution measures, and MCDM techniques. Three monetary dangers for producing 2-way grouping results estimated utilizing eleven execution rules Six bunches chose for the data set Using calculations is the initial step. The subsequent advance is to sort the grouping calculations utilizing three MCDM techniques (i.e., TOPSIS, DEA and VIKOR), which make execution strides as data sources. Each MCDM framework creates a positioning of grouping calculations for each dataset. Three MCDM strategies are chosen for positioning grouping calculations since appraisals acknowledged by different MCDM techniques More solid than those created by a MCDM framework. The last advance is to suggest a high-positioning bunching calculation through MCDM techniques to leaders. [27] Therefore, aIntegrated MCDM technique DEMATEL and ANP methods are proposed in this paper to address this. Difficulty in overcoming the problem of interdependence and feedback between criteria and alternatives. Furthermore, this study uses the DEMATEL method to measure the influence of these criteria, and ANP to gain comparative significance This is considered to be the basis of natural supermetrics for calculating weights. In addition, an empirical study has demonstrated that the proposed method is more appropriate. Furthermore, we use the concept of best point by setting the desired / desired positions to indicate the gap between relevant vendor performance. And the desired / desired dimensions of each criterion. [33] The advancement of MCDM has moved the concentration from positioning and choosing options in contrast to further developing their exhibition. More seasoned models can distinguish holes between contending choices. The reasonable technique is to limit the hole to accomplish a recent fad, an aspiring position. For instance, in the event that activities for estimating execution esteem are from zero to ten) the most noticeably awful worth and the ten (10) want level. We can in this way investigate elective ways of decreasing the hole dependent on the persuasive organization correspondence chart. It is recently made The model permits leaders to feel the hole between the flows. More seasoned models can recognize holes between contending choices. A recent fad, The most sensible procedure is to lessen the hole to come to an optimistic position. For instance, in the event that the actions for estimating execution esteem are from zero to ten, then, at that point, the most exceedingly awful worth and the ten (10) want condition. An option in contrast to restricting the hole dependent on the powerful organization association map We can along these lines investigate the ways. This recently made model permits leaders to feel the hole between the flows

Decision Making

[16] However, if there are consumers not aware The relationship between certain characteristics and benefits themselves or in their homes, the value of the property will not be reflected. Again, This method focuses on obtaining economic values assets and it is difficult identify certain Environmental and social factors. Also, the amount of data that needs to be collectedhedonics modeling is enormous. Many Due to conflicting factors, multi-dimensional decision making (MCDM) methods are considered to be the most suitable for this problem and they are used as a basis. Are standard. Home Appraisal. [18] The OWA operator provides an integrated framework To make a decision in uncertainty, the Maximax, Maximine, Laplace and Harwich criteria are characterized by different OWA operator weights. To use the OWA operator to make a decision, determining its weight is an important issue that can be accomplished as follows. [19] In cases where there are significant differences between the weights of the MCDM methods, the decision makers will use the MCDM methods. Can be chosen arbitrarily because their rating is closer to a better rating than other methods. [20] Multi-level decision-making (MCDM) methods are used for a variety of energy issues, including energy planning and selection, energy resource allocation, energy policy and building. Energy management [18]. These issues range from complex multi-level decision making to solving problems such as profit or cost reduction [19]. According to Wang et al. [18], investment cost, CO2 emissions, commonly used criteria are performance, operation and maintenance cost, land use, fuel cost and job creation. [39] For Energy Technical Assessment A literature review was conducted with the aim of reviewing the published criteria and indicators used. It To identify the most important criteria for comparing energy generation technologies Helps. Some authors read Stability Rating indicators for renewables or nuclei [29]. Other authors have been developing indicators for sustainability assessment to support decision-making in the electrical field. Table 1 provides a complete set of indicators. The long-term sustainability assessment of the energy technology site covers economic, environmental and social aspects. [44] In the case of multicrystal decision making (MCDM), if there are priorities between criteria, we Call it the MCDM problem. [45] The Integrated End Testing and Evaluation Laboratory (DEMATEL) used the Analysis hierarchy Method for selecting the best renewable energy option (ANP) for Turkey.Developed a system for selecting Renewable Energy Technologies for Pakistan. Created a priority system to improve renewable energy security in the Philippines. [55] Haralambopoulos and Polatidis [16] provided a compliance panel decision framework to support multidimensional analysis in renewable energy projects and used the PROMETHEE II technique as a ranking system. Beckley et al. [17] Introduced the

use of multicriteria decision method (MCDM)Used to evaluate the action plan for the use of renewable energy technologies at the regional level. [57] Decision making with multiple criteria The strong choice of green technologies takes into account multiple criteria. These criteria may be technology such as capacity requirements, spatial requirements, reliability and flexibility; Such as capital cost, operating cost and maintenance cost Economy; Environment such as carbon reduction and energy saving capacity; Community such as citizenship and security and job creation. These criteria may affect the decision maker's goal and reflect different priorities, which may be referred to as weights in decision support systems.

VIKOR

[1] The VIKOR system was developed for various upgrades of complex systems. It determines the weight stability intervals of the compromise ranking list, the compromise solution and the optional consistency for the compromise solution obtained by the initial (given) weights. [7] Ranking classification algorithms generally study a number of criteria, such as accuracy, AUC, F-scale, and kappa statistics. Therefore, the algorithm can process the selection process into MCDM problems. This section describes the five selected MCDM methods (Top Size, Electric III, Gray Relational Analysis, and Malignancy. [13] Performance analysis is performed on the basis of selected evaluation criteria. The FAHP approach is first used to calculate performance appraisal weights, comparisons, and evaluations. , Three MCDM analysis tools SAW, TOPSIS and VIKOR are used to rank and improve banking performance and determine best practice. [30] Subsequently, the VIKOR method is used to integrate performance gaps with influential weights (DANP) from scales to dimensions and aggregates. Then, you can decide how to improve business performance. Research processes are explained. [32] The hybrid MCDM instruments used in this research are DEMATEL, DANP and VIKOR techniques. First, DEMATEL was used to confirm the effect of each criterion Explore the relevance of policy parameters, the environment and human Examine the impact of tourism policies on society.Then, of DEMATEL and ANP's new hybrid policy criteria DANP approach to weight calculation (Saathi, 1996) accepted. [40] The VIKOR system was first developed by Obrikovich DANP approach to weight calculation Complex systems. Serbian name: VIseKriterijumska Optimizacijai Compromise Resenje (meaning different criteria) optimization and compromise solution) (Opricovic& Tzeng, 20202). The VIKOR system, with its consistency and cardinal information, is easy to use and convenient for selection issues. [52] A comprehensive VIKOR method for selecting material for the femoral organ of a knee replacement in the medical field. Rao (2008) used an improved Suitable for engineering applications Compromise ranking system to select object, two examples illustrated to illustrate the proposed model from that. The first is to select the material suitable for the metal dipole plate and the other is to select the material suitable for the high temperature environment. Four alternatives and four criteria. [65] The VIKOR technique is used to estimate the interval between compromises and alternatives. In summary, the structure of the appraisal consists of three main stages: (1) the creation of a network communication map (NRM) between the criteria of the DEMATEL technique, (2) the weighting of each criterion by the ANP based on the NRM, and (3) the ranking or upgrade of the alternative priorities for portfolios by VIKOR. [75] In this section, this The article presents a new obscure MCDM technique based on VIKOR, interval value and Euclidean distance obscure numbers. This method deals with complex decision making Often ambiguous processes: inaccurate, indefinite, subjective and ambiguous data and / or information. This method utilizes the key technique of ambiguous packages related to ambiguous information and / or orderly data because gap-value ambiguous packages can provide the flexibility to represent incorrect / ambiguous information as a result of data scarcity. [77] Third, we attach VIKOR to sort these weights, the effectiveness of the alternatives offered to the decision maker and the Identifying gaps for an alternative where each alternative is not yet available; Performance gaps of each criterion and dimension through future discovery and research This approach gives us a blueprint for how to improve each alternative by minimizing.

Multiple Criteria

[27] The DEMATEL method is based on the graph theory, which helps to better understand the causal relationships for planning a network relationship map, and to solve problems and solve problems by dividing A cause-and-effect Multiple criteria as a group.Enabled maps (also called maps) orientation maps Are more effective than because they represent the directed relationships of the subsystems. A digraph usually refers to a communication network or some dominant relationship between individuals. [83] This method seeks a multi-dimensional precedent Assessing risk aversion coefficients requires a minimal amount of data, which converts into a practical one. Access to any real farming system despite limited data. The paper is organized as follows: Part 2 Assessing risk aversion coefficients requires a minimal amount of data, which converts into a practical one. Access to any real farming system despite limited data. The paper is organized as follows: Part 2An example of the many criteria for addition. Subsequently, the mathematical formulation required for the third type of sensitivity analysis was obtained in Section 3 and extended in Section 4. Sensitivity The analysis is designed in Section 5 of the explanatory problem to illustrate what is proposed. The results of this experiment are presented in Section 6 and discussed.

Analytic Hierarchy Process

[3] The AHP system should be an accurate measure of the difference in attribute preferences for consumers and the results of this approach will be better than others. For reasons, this study evaluates the custom weight of flight characteristics for customers using the AHP method. [11] However, in the process of using the AHP method, It is easy and humane for evaluators to estimate that "criterion A is more important than criterion B than the importance of policy A and policy B".

Seven to one ". Therefore, Buckley [7] extended Satyrs AHP to allow evaluators Use ambiguous ratios instead of exact ratios to obtain the difficulty of assigning exact ratios when comparing the two criteria and obtain the ambiguous weight of the criteria by the geometric mean. Method. [23] AHP and ANP methods use a series of comparison procedures to obtain custom vectors from the matrix. SWARA The method is used due to its simplicity and low number of steps. However, there is no SWARA method like DEMATEL Ability to determine the consistency of the comparisons obtained. For this reason, the SWARA method is much less commonly used in the literature than the two previously mentioned methods (AHP and DEMATEL), as evidenced by BWM, which is increasingly used in the short term. Some authors see this. Adequate alternative to AHP. Small number compared to AHP Pair comparisons (2n - 3) are the main advantage. However, the degree of consistency of this method One can be up to, which in some cases reflects a high degree of subjectivity. [31] As proposed, AHP uses its ambiguous extension, ambiguous AHP, to prioritize machine tool selection criteria and weigh the most conclusive results in the presence of ambiguity. There are various ambiguous AHP applications in the literature that justify the problem using systematic approaches to select alternatives and ambiguous synthesis theory and hierarchical system analysis. [36] AHP A uses verbal quantity (quality), which naturally allows participantsCombine subjective expert research input, personal experience, expressed expert opinions and intuition. A key strength of AHP is the pair-wise comparison described in the case study, in which the influence of the components at a given level is measured to a minimum. After a matrix is formed, the relative weight of each element is obtained. [61] The rest of the paper is organized as follows. The proposed model is described in the "Proposed Model" section. Theoretical explanations for ambiguous AHP and ambiguous TOPSIS methods are provided in the subsections "Fuzzy AHP Process" and "Fuzzy TOPSIS" respectively.In the "Case Study" section, a real-world case is presented to prove the applicability of the proposed method to a medium-sized manufacturing company in Istanbul. [71] AHP (analysis hierarchical process), and LINMAP (linear programming techniques for multi-dimensional analysis options). The choice of method depends on the nature of the problem. Evaluating the best project is a complex and wide-ranging issue, so this issue requires more content And flexible approach. Since AHP was developed by Satyr, it is a very useful decision-making analytical tool for dealing with multiple criteria decision making. And has been used successfully for many construction industry end areas, however, in the use of the AHP method.

Conclusion

ANP is the most common form of AHP. Therefore, the results of the assessment obtained by ANP are close to the actual practice. MCDM to provide controls of hierarchical structure ANP used for. It was used for project selection product planning, strategic decision making and optimal planning. ANP is strong, therefore, very Appropriate approach to this type of complex MCDM problem, the benefits of ANP only for quantity and static data types Not suitable, but suitable for problem solving and feedback on criteria. However, if there are consumersWithout knowing the And some of their characteristics The relationship between benefits in themselves or in their homes, the value of the property Does not reflect.Again, this time Focuses on obtaining economic values for assets and some environmental and social factors can be difficult to identify. Also, the amount of data that needs to be collected Hedonic modeling is huge. Due to a number of conflicting factors, multi-criterion decision-making (MCDM) methods are considered the most appropriate for this problem, based on the standard housing assessment. Are used. The VIKOR system was developed for a variety of optimizations of complex systems. It determines the compromise ranking list, compromise solution and weight stability gaps The compromise solution obtained by the initial (given) weights is the preferred stability. [7] Ranking classification algorithms generally examine a number of criteria, such as accuracy, AUC, F-scale, and kappa statistics. Therefore, the algorithm can design the selection process into MCDM problems. This section is about five selected MCDM systems (Tipsy, Electro III, Gray Relational Analysis, Vigor) Provides an overview. Based on the DEMATEL method graph theory, Helps to plan and solve problems. Visually, we can divide several criteria into a cause-and-effect group, to better understand the causal relationships for planning a network relationship map. Operated maps (also called diagrams) are more effective than directional maps because they represent the directed relationships of the subsystems. A digraph is usually an information Communication can refer to a network or some dominant relationship between individuals. The AHP method must be accurateMeasuring the variance of the attribute preference for the consumer and the results of this approach are better than others. For reasons, this study evaluates the custom weight of aviation attributes for customers using the AHP method. [11] However, in the process of applying the AHP method, evaluators have noted the importance of "A and Policy B". It is easier and more humane to estimate that "criterion A is more important than criterion B" than is considered".

Reference

1. Zavadskas, EdmundasKazimieras, and ZenonasTurskis. "Multiple criteria decision making (MCDM) methods in economics: an overview." Technological and economic development of economy 17, no. 2 (2011): 397-427.
2. Tzeng, Gwo-Hshiung, Cheng-Hsin Chiang, and Chung-Wei Li. "Evaluating intertwined effects in e-learning programs: A novel hybrid MCDM model based on factor analysis and DEMATEL." Expert systems with Applications 32, no. 4 (2007): 1028-1044.
3. Kou, Gang, Yi Peng, and Guoxun Wang. "Evaluation of clustering algorithms for financial risk analysis using MCDM methods." Information Sciences 275 (2014): 1-12.
4. Yang, Jiann Liang, and Gwo-Hshiung Tzeng. "An integrated MCDM technique combined with DEMATEL for a novel cluster-weighted with ANP method." Expert Systems with Applications 38, no. 3 (2011): 1417-1424.

5. Zavadskas, EdmundasKazimieras, and ZenonasTurskis. "Multiple criteria decision making (MCDM) methods in economics: an overview." Technological and economic development of economy 17, no. 2 (2011): 397-427.
6. Lin, Ya-Ti, Chia-Li Lin, Hsiao-Cheng Yu, and Gwo-Hshiung Tzeng. "A novel hybrid MCDM approach for outsourcing vendor selection: A case study for a semiconductor company in Taiwan." Expert systems with applications 37, no. 7 (2010): 4796-4804.
7. Yazdani, Morteza, Sarfaraz HashemkhaniZolfani, and EdmundasKazimierasZavadskas. "New integration of MCDM methods and QFD in the selection of green suppliers." Journal of Business Economics and Management 17, no. 6 (2016): 1097-1113.
8. Mulliner, Emma, NaglisMalys, and Vida Maliene. "Comparative analysis of MCDM methods for the assessment of sustainable housing affordability." Omega 59 (2016): 146-156.
9. Dursun, Mehtap, and E. ErtugrulKarsak. "A fuzzy MCDM approach for personnel selection." Expert Systems with applications 37, no. 6 (2010): 4324-4330.
10. Peng, Yi, Gang Kou, Guoxun Wang, and Yong Shi. "FAMCDM: A fusion approach of MCDM methods to rank multiclass classification algorithms." Omega 39, no. 6 (2011): 677-689.
11. Lee, Hsing-Chen, and Ching-Ter Chang. "Comparative analysis of MCDM methods for ranking renewable energy sources in Taiwan." Renewable and Sustainable Energy Reviews 92 (2018): 883-896.
12. Streimikiene, Dalia, Tomas Balezentis, Irena Krisciukaitienė, and AlvydasBalezentis. "Prioritizing sustainable electricity production technologies: MCDM approach." Renewable and sustainable energy reviews 16, no. 5 (2012): 3302-3311.
13. Yu, Xiaohan, Suojuan Zhang, Xianglin Liao, and Xiuli Qi. "ELECTRE methods in prioritized MCDM environment." Information Sciences 424 (2018): 301-316.
14. Alizadeh, Reza, LeiliSoltanisehat, Peter D. Lund, and Hamed Zamanisabzi. "Improving renewable energy policy planning and decision-making through a hybrid MCDM method." Energy Policy 137 (2020): 111174.
15. Çolak, Murat, and İhsan Kaya. "Prioritization of renewable energy alternatives by using an integrated fuzzy MCDM model: A real case application for Turkey." Renewable and sustainable energy reviews 80 (2017): 840-853.
16. Si, Jin, LjiljanaMarjanovic-Halburd, FuzhanNasiri, and Sarah Bell. "Assessment of building-integrated green technologies: A review and case study on applications of Multi-Criteria Decision Making (MCDM) method." Sustainable Cities and Society 27 (2016): 106-115.
17. Opricovic, Serafim, and Gwo-Hshiung Tzeng. "Compromise solution by MCDM methods: A comparative analysis of VIKOR and TOPSIS." European journal of operational research 156, no. 2 (2004): 445-455.
18. Kou, Gang, Yanqun Lu, Yi Peng, and Yong Shi. "Evaluation of classification algorithms using MCDM and rank correlation." International Journal of Information Technology & Decision Making 11, no. 01 (2012): 197-225.
19. Wu, Hung-Yi, Gwo-Hshiung Tzeng, and Yi-Hsuan Chen. "A fuzzy MCDM approach for evaluating banking performance based on Balanced Scorecard." Expert systems with applications 36, no. 6 (2009): 10135-10147.
20. Chiu, Wan-Yu, Gwo-Hshiung Tzeng, and Han-Lin Li. "A new hybrid MCDM model combining DANP with VIKOR to improve e-store business." Knowledge-Based Systems 37 (2013): 48-61.
21. Liu, Chui-Hua, Gwo-Hshiung Tzeng, and Ming-Huei Lee. "Improving tourism policy implementation–The use of hybrid MCDM models." Tourism Management 33, no. 2 (2012): 413-426.
22. Tadić, Snežana, Slobodan Zečević, and MladenKrstić. "A novel hybrid MCDM model based on fuzzy DEMATEL, fuzzy ANP and fuzzy VIKOR for city logistics concept selection." Expert systems with applications 41, no. 18 (2014): 8112-8128.
23. Anojkumar, L., M. Ilangkumaran, and V. Sasirekha. "Comparative analysis of MCDM methods for pipe material selection in sugar industry." Expert systems with applications 41, no. 6 (2014): 2964-2980.
24. Ho, Wen-Rong Jerry, Chih-Lung Tsai, Gwo-Hshiung Tzeng, and Sheng-Kai Fang. "Combined DEMATEL technique with a novel MCDM model for exploring portfolio selection based on CAPM." Expert Systems with Applications 38, no. 1 (2011): 16-25.
25. Kuo, Ming-Shin, and Gin-Shuh Liang. "A soft computing method of performance evaluation with MCDM based on interval-valued fuzzy numbers." Applied Soft Computing 12, no. 1 (2012): 476-485.
26. Lu, Ming-Tsang, Shi-Woei Lin, and Gwo-Hshiung Tzeng. "Improving RFID adoption in Taiwan's healthcare industry based on a DEMATEL technique with a hybrid MCDM model." Decision Support Systems 56 (2013): 259-269.
27. Yang, Jiann Liang, and Gwo-Hshiung Tzeng. "An integrated MCDM technique combined with DEMATEL for a novel cluster-weighted with ANP method." Expert Systems with Applications 38, no. 3 (2011): 1417-1424.
28. Gómez-Limón, José A., Manuel Arriaza, and Laura Riesgo. "An MCDM analysis of agricultural risk aversion." European Journal of Operational Research 151, no. 3 (2003): 569-585.
29. Wolters, W. T. M., and Bertrand Mareschal. "Novel types of sensitivity analysis for additive MCDM methods." European Journal of Operational Research 81, no. 2 (1995): 281-290.

30. Tsaur, Sheng-Hshiung, Te-Yi Chang, and Chang-Hua Yen. "The evaluation of airline service quality by fuzzy MCDM." Tourism management 23, no. 2 (2002): 107-115.
31. Hsieh, Ting-Ya, Shih-Tong Lu, and Gwo-Hshiung Tzeng. "Fuzzy MCDM approach for planning and design tenders selection in public office buildings." International journal of project management 22, no. 7 (2004): 573-584.
32. Pamučar, Dragan, ŽeljkoStević, and SinišaSremac. "A new model for determining weight coefficients of criteria in mcdm models: Full consistency method (fucom)." Symmetry 10, no. 9 (2018): 393.
33. Önüt, Semih, TuğbaEfendigil, and Selin Soner Kara. "A combined fuzzy MCDM approach for selecting shopping center site: An example from Istanbul, Turkey." Expert systems with applications 37, no. 3 (2010): 1973-1980.
34. Nigim, K., N. Munier, and J. Green. "Pre-feasibility MCDM tools to aid communities in prioritizing local viable renewable energy sources." Renewable energy 29, no. 11 (2004): 1775-1791.
35. Önüt, Semih, Selin Soner Kara, and TuğbaEfendigil. "A hybrid fuzzy MCDM approach to machine tool selection." Journal of intelligent manufacturing 19, no. 4 (2008): 443-453.
36. Chen, Vivien YC, Hui-Pang Lien, Chui-Hua Liu, James JH Liou, Gwo-Hshiung Tzeng, and Lung-Shih Yang. "Fuzzy MCDM approach for selecting the best environment-watershed plan." Applied soft computing 11, no. 1 (2011): 265-275.
37. Dr. Amol Lokhande, Dr. C. Venkateswaran, Dr. M. Ramachandran, C. Vidhya, R. Kurinjimalar, A Study on Various Implications on Reusing in Manufacturing, REST Journal on Emerging trends in Modelling and Manufacturing 7(2), 2021, 63-69.
38. Dr. Amol Lokhande, Dr. C. Venkateswaran, Dr. M. Ramachandran, S. Chinnasami, T. Vennila, A Review on Various Implications on Re engineering in Manufacturing, REST Journal on Emerging trends in Modelling and Manufacturing Vol: 7(3), 2021,70-75.
39. Dr. Amol Lokhande, Dr. C. Venkateswaran, Dr. M. Ramachandran, C. Sathiyaraj, K. Nathiya, Recycling Process Impact in Current Scenario Manufacturing: A Study, Recent trends in Management and Commerce Vol: 2(1), 2021, 20-25.
40. Gadde Mehar Chaitanya, M.P.Jenarthanan, C. Sathiyaraj, A Review on Glass fibre Reinforced Composites with Different Matrix, REST Journal on Emerging trends in Modelling and Manufacturing Vol: 7(1), 2021, 18-24.
41. R. Kurinjimalar, S. Vimala, M. Silambarasan, S. Chinnasami, A Review on Coir fibre Reinforced Composites with Different Matrix, REST Journal on Emerging trends in Modelling and Manufacturing Vol: 7(2), 2021, 25-32.
42. P. K. Chidambaram, Dr. Amol Lokhande, Dr. M. Ramachandran, Vimala Saravanan, Vidhya Prasanth, A Review on Biodiesel Properties and Fatty acid composites, REST Journal on Emerging trends in Modelling andManufacturing Vol: 7(3), 2021, 87-93.
43. P.K.Chidambaram, Dr. Amol Lokhande, Dr. M. Ramachandran, M. Nathiya, G. Mathivanan, A study on Carbon Fiber Based Polymer Rein Force composites, REST Journal on Emerging trends in Modelling andManufacturing Vol: 7(3), 2021, 94-100.
44. Dheenadhayalan, V. "An Analysis of Financial Health of Select Indian Bulk Drugs and Formulations Companies* Mrs. R. Selvi."
45. Banana, K. R. I. S. H. N. A., and R. V. Chepuri. "Role of recovery channels in managing non-performing assets in scheduled commercial banks." International Journal for Innovative Research in Multidisciplinary Field 2, no. 10 (2016): 355-359.
46. Dheenadhayalan, V., and R. Devianbarasi. "Financial health of cooperative sugar mills-a case study of NPKRR cooperative sugar mill ltd." Indian Cooperative Review 46, no. 3 (2009): 192-197.
47. Dheenadhayalan, V., and D. Rajaprabu. "Loan Assets in New Private Sector Banks in India." Asian Journal of Management 5, no. 3 (2014): 347-353.
48. Dheenadhayalan, V. "Impact of E-Commerce on the Changes in Consumer's Buying Behaviour in Malappuram District." Annals of the Romanian Society for Cell Biology (2021): 3441-3452.
49. Dheenadhayalan, V., and R. Shanmuga Priya. "Influencing Factors on Purchase Decision of Women Two-Wheeler Users." Annals of the Romanian Society for Cell Biology (2021): 3430-3440.
50. DHEENADHAYALAN, V. "Impact Of Training And Development On Performance Appraisal Of Employees In Information Technology Companies A Study With Reference To Chennai City."
51. Dheenadhayalan, V. "Mudra-A Tool for Uplifting Micro Enterprises in India." International Journal in Management & Social Science 4, no. 12 (2016): 235-246.
52. Anvitha, E. D., and Manashree Mane. "Forensic significance of fibre transfer through weapon thrust."
53. Mane, Manashree, and Vaishnavi Narreddy. "Estimation of sexual dimorphism using epidermal ridge breadth measurements in Indian population." International Journal of Medical Toxicology & Legal Medicine 24, no. 1and2 (2021): 242-248.
54. Dhaarani, S. D., Sona Ponnuswamy, and Manashree Mane. "A Study on Impact of Pellets on Different Targets-A Preliminary Study." Medico-Legal Update 21, no. 4 (2021).
55. Sreekumar, Krishnendhu, Rohith Krishna, Sheetal Rajan, and Manashree Mane. "A study on the transfer and persistence of glass fragments on various fabrics-a forensic perspective."

56. Chaudhari, Rakesh, Riddhish Parekh, and Asha Ingle. "Reliability of dissimilar metal joints using fusion welding: A Review." In International Conference on Machine Learning, Electrical and Mechanical Engineering (ICMLEME: 2014).–2014. 2014.
57. Tibadia, Rajkumar, Koustubh Patwardhan, Dhrumil Shah, Dinesh Shinde, Rakesh Chaudhari, and Kanak Kalita. "Experimental investigation on hole quality in drilling of composite pipes." Transactions of the Canadian Society for Mechanical Engineering 42, no. 2 (2018): 147-155.
58. Kalita, Kanak, Rakesh Chaudhari, and M. Ramachandran. "Mechanical characterization and finite element investigation on properties of PLA-jute composite." International Journal of Computer Applications 123, no. 13 (2015).
59. Chaudhari, Rakesh, Asha Ingle, and Kanak Kalita. "Stress analysis of dissimilar metal weld between carbon steel and stainless steel formed by transition grading technique." Materials Today: Proceedings 2, no. 4-5 (2015): 1657-1664.
60. Kittur, Jeevan, Bhavya Desai, Rakesh Chaudhari, and Praveen Kumar Loharkar. "A comparative study of EMI shielding effectiveness of metals, metal coatings and carbon-based materials." In IOP Conference Series: Materials Science and Engineering, vol. 810, no. 1, p. 012019. IOP Publishing, 2020.
61. Chaudhari, Rakesh, and Asha Ingle. "Experimental investigation of dissimilar metal weld of SA335 P11 and SA312 TP304 formed by gas tungsten arc welding (GTAW)." Transactions of the Indian Institute of Metals 72, no. 5 (2019): 1145-1152.