



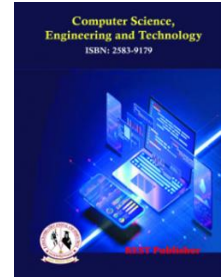
Computer Science, Engineering and Technology

Vol: 4(1), March 2026

REST Publisher; ISSN: 2583-9179

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

DOI: <https://doi.org/10.46632/cset/4/1/1>



Evaluation of Flexibility Components for Improving Housing Quality Using the DEMATEL Decision Making Analysis

*Anusuya Mohan, Manjula Selvam, Nathiya Murali, M. Ramachandran

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

*Corresponding Author Email: anusuyarsri2000@gmail.com

Abstract: Introduction: When selecting a biomass source capable of generating sufficient bio-oil, numerous factors must be considered. These factors encompass the availability, chemical composition, and physical properties of the biomass. Various biomass sources have undergone extensive scrutiny and validation for their suitability in bio-oil production. Research Significance: Flexibility in house design may improve liability and the capacity to adapt to changing needs. Efficiency and Sustainability Availability and Efficiency in Costs: Disaster mitigation and resilience: Flexibility in house design can improve disaster mitigation and resilience. Housing units can be made more resistant to natural catastrophes and other disruptive occurrences by adding flexible components. The results of this research may help to reduce the susceptibility of communities to the effects of disasters by identifying design elements and practices that enhance housing resilience. Policy and Planning Implications: Decisions about housing quality and affordability can be influenced by research on flexible housing components. Policymakers, urban planners, and housing developers may use the research's findings as a guide for creating rules, benchmarks, and incentives to support flexible and high-quality housing. Methodology: To achieve their objectives, people and organisations must decide which course of action is best given the circumstances. Almost every academic discipline is represented in the multidisciplinary subject of decision-making research. Utilizing scientific techniques is equally crucial as using intelligence, intuition, and experience in decision-making. Alternative Parameter: "Neutral for furnishing, Possibility for change of floor plan, Possibility to reshape apartments, Modernization flexibility, Character flexibility". Evaluation Parameter: "Neutral for furnishing, Possibility for change of floor plan, Possibility to reshape apartments, Modernization flexibility, Character flexibility". Result: The ranking of each component based on the Rice values, where the components are ranked as follows: neutral for furnishing (1), possibility for change of floor plan (2), character flexibility (3), modernization flexibility (4), and possibility to reshape apartments (5). Conclusion: This ranking order implies that "Neutral for furnishing" holds the highest level of influence among the components, followed by "Possibility for change of floor plan," "Character flexibility," "Modernization flexibility," and finally, "Possibility to reshape apartments." By considering the ranks derived from the combined effect (Rice), we gain a relative comparison among the components, enabling a better understanding of their significance in the context of improving house quality.

Keywords: Policy, Planning, Modernization, Character flexibility.

1. INTRODUCTION

There are a number of factors to take into consideration in order to raise the overall quality of your home. Priority one should be given to making sure the entire house is properly insulated. A comfortable interior atmosphere may be maintained, and energy efficiency can be considerably increased by upgrading the insulation in walls, the attic, and the flooring. Windows and doors are essential for enhancing the condition of a residence. By installing draft-free, well-insulated windows and doors with low-emissivity coatings, one may improve insulation, increase energy efficiency, and enhance comfort. "Improved heating, ventilation, and air conditioning (HVAC) systems may significantly improve the quality of your home". Energy efficiency, utility expenses, and indoor air quality may all be improved by installing high-efficiency furnaces, heat pumps, or air conditioners. Regular HVAC system maintenance is also necessary for optimum operation. By reducing physical obstacles from the house, a housing

modification aims to increase usability and accessibility while enhancing daily activities. This study looked at clients who received funding for housing adaptations and tracked improvements over time in housing accessibility. Prior to the housing adaptation, baseline evaluations were given. The initial check-in took place within a span of two to three months, while the subsequent check-in occurred between eight and nine months later. A total of 131 participants were included in the study, and data was collected using the Housing Enabler and Usability in My Home tools in regular residential settings. Throughout the study, there was a noticeable reduction in physical barriers, significant enhancements in accessibility and functionality, and an increased dependence on assistive devices for mobility. The findings highlight the difficulty of housing adaptation and the necessity of taking long-term interactions between people and their environments into account. The approach appears to be helpful for the quality development of assessment, intervention, and evaluation procedures in home modifications carried out by occupational therapists. Regarding the various housing demands of inhabitants and the requirement for alterations throughout the development phase, flexibility is a key idea. Additionally, figuring out and putting into practise the flexibility's component parts has a big impact on raising the standard of housing. The study's goals include looking at housing quality indicators and figuring out how these indicators and flexibility factors relate to one another. The components and indications were taken out utilising the literature that was accessible. The Delphi approach was then completed once the data had been gathered and the questionnaires had been distributed to the house design specialists. According to the findings, providing multifunctional spaces and having expandable space had the most effects on the flexibility of a home's quality. As information systems have evolved from a hierarchical/monolithic to a network-based structure, the range of potential data sources that companies may use has considerably increased in size and breadth. This development has made the issue of data quality more challenging and divisive. Intricate information exchanges are common among processes in networked information systems, and they often rely on input from external sources that frequently surprise us. Failure to maintain proper control over processes and information inputs can result in a rapid decline in the overall quality of data transmitted through information systems. The emergence of networked information systems brings forth two fresh possibilities for data quality management: the availability of a broader array of data sources and the capacity to compare and select data from different sources, enabling the identification and rectification of errors to enhance data quality holistically. Developed countries have displayed an increasing interest in mental health and the psychosocial advantages linked to housing outcomes, particularly in regions where the most severe physical health consequences of substandard housing have been eradicated or significantly reduced. Recent data obtained from an extensive survey of social renters in Glasgow have opened up new avenues for in-depth analysis of the psychological benefits of various property types and housing renovation programs, surpassing previous levels of accessibility. The findings strongly indicate that making enhancements to one's living environment can yield substantial benefits for mental well-being. influence the psychological benefits that homeowners derive from their houses through their impact on perceived home quality. It has been shown that the relationships between landlords and the overall calibre of the neighbourhood where repairs take place are the main modifiers of this correlation. The general manner in which landlords give service. The perception of popular houses as well as psychological status and control are all influenced by efforts to educate tenants, listen to their input, and all three. When families purchase homes, they receive a variety of services in a particular location. A specified number of square feet of living space, different room kinds, a particular building type, a location, the accessibility of jobs, and a neighbourhood are some examples. environment, a neighbourhood, and a range of public and quasi-public services, including security provided by the police, access to educational institutions, and rubbish collection. Numerous published studies have sought to break out the contributions of these specific elements to the overall payments (rent or purchase price) for residential services. For instance, using data from census tracts, Rider and Henning [23] assessed the effect of variables including air pollution, downtown accessibility, school quality, and substandard Ness on the average value of single-family homes. Similar analyses have been generated by Moth, Oates, Pendleton, and others. A technique for assessing the sustainability of construction projects is provided in "NS-EN 15643-1 Sustainability of construction works." Assessment of a building's sustainability: Part 1: General framework [8]. The zero-energy performance serves as the functional equivalent of each strategy when comparing the viability of different zero energy renovation techniques for homes. According to the standard, a building's social, economic, and environmental performance must be assessed during its whole lifespan. In addition to functional and technical requirements for buildings, the sustainability evaluation must contain these. The evaluation is supported by numerical indicators [9–11]. The standard outlines a framework for the overall methodology as well as potential indicators to measure sustainability. However, it does not provide a technique for carrying out the evaluation or for analysing any inconsistencies between performance standards, such as higher insulation levels and higher investment costs. Concepts representing an intervention's aims must be precisely defined and operationalized in order to provide strategies relevant for assessment. This study incorporated knowledge from occupational therapy, traffic engineering, and planning over the course of more than ten years of methodological development and empirical research on accessibility to the physical environment (Isaksson and Suhl, 2003). Accessibility, as defined by Isaksson and Suhl (2003), is a relative notion that describes the interaction

between a person's functional capabilities and physical environmental constraints. In other words, accessibility may be explained by contrasting an individual's functional ability (the personal component) with external obstacles (the environmental component). The environmental component of accessibility conforms with government rules and regulations for the physical environment, but the human component is based on factual facts concerning functional capabilities, suggesting that accessibility is mostly objective in nature. Usability suggests that a person should be able to interact with, move through, and utilise the environment on an equal footing with other people. Information about the person-environment interaction is essential for usability much as it is for accessibility, but more crucially, Numerous evaluation techniques have been developed to determine the housing quality. These currently available assessment methods are intended to either attain a sufficient standard for residential units in which public funds must be invested or to make it possible for developers to include these criteria in their projects. (2) help architects to select the most appropriate of several design alternatives at the preconstruction stage based of client's perception of quality and (3) determine price dependent 'fair' quality in housing market. Adequate Space and Layout: Adequate living space is crucial for promoting physical and mental well-being. Ensuring proper room sizes, functional layouts, and storage space can contribute to improved housing quality.

2. DEMATEL

To effectively address the current challenges faced by global managers in today's business environment, it is crucial for them to possess a diverse range of competencies or multiple intelligences. Consequently, enhancing the competencies of global managers has become a pressing concern. Many scholars and experts have proposed various models of competencies, outlining a list of necessary skills. However, mastering a wide range of skills simultaneously can be a daunting task. This raises the urgent question of "how to enhance the abilities of global managers by breaking down competencies into manageable parts and facilitating step-by-step competence development". Unlike conventional multiple criteria decision-making methods that assume criteria are independent, the DEMATEL approach does not make such an assumption. Instead, it helps decision-makers uncover the interrelationships among the criteria. By using the DEMATEL technique, causal relationships between the seven criteria were established, and their relative importance was assessed. The findings revealed that the most critical requirement is the presence of trusted medical personnel with professional expertise in healthcare. The influence of well-equipped medical equipment on trusted medical staff with professional competence in healthcare was found to be negligible compared to the impact of the other five criteria related to professional competence in healthcare. Therefore, high-quality medical equipment is not deemed essential. From the perspective of hospital administration, effective communication skills and quick problem-solving abilities in service personnel were identified as the two most crucial requirements for strengthening trusted medical staff with professional competence in healthcare. The Decision-Making Trial and Evaluation Laboratory (DEMATEL) technique has been widely used to identify crucial elements in various fundamental systems. However, while significant progress has been made in enhancing its effectiveness, it remains more suitable for basic systems and struggles to address decision-making challenges that arise in complex systems. This work aims to develop a hierarchical approach specifically designed for complex systems with diverse system elements, impacts, and hierarchies. To address the complexity of DEMATEL in complex systems, a hierarchical decomposition is proposed, dealing with both horizontal and vertical aspects. The horizontal decomposition simplifies the DEMATEL problem by decomposing it into subsystems, while the vertical decomposition considers the existence of hierarchy and different system elements with various impacts. Additionally, a direct influence analysis is suggested to create initial direct-relation (IDR) matrices for the components of each subsystem. A super IDR matrix is then formed by integrating the IDR matrices for all pairs of subsystems at all levels in a recursive manner. By incorporating the super IDR matrix into the procedure, a hierarchical approach consisting of three algorithms is developed for identifying essential elements. Finally, two illustrative examples are presented to highlight the superiority of the proposed method and its algorithms. This method lets decision makers detect the haphazard links among criteria, as opposed to standard multiple criteria decision-making procedures that often believe the criteria are mutually independent. 13 responders are also the decision-makers in charge of performance assessment. of outreach employees at "the Council of Labour Affairs of the Executive Yuan in Taiwan's Bureau of Employment and Vocational Training, which increases the value of the causal links". The findings indicate that when the effectiveness of the outreach staff in the Employment Service Outreach Programme is assessed, the identification of the number of jobless persons and the number of follow-up visits are the two most crucial factors within the category of job-seeking service. To achieve their objectives, people and organisations must decide which course of action is best given the circumstances. Almost every academic discipline is represented in the multidisciplinary subject of decision-making research. The term "MCDM methods" refers to the process of numerically assessing alternatives while simultaneously considering several criteria in an issue. By combining many disciplines, such as management and

mathematics, enables decision-makers to make assessments and judgements in numerous dimensions Economics, social sciences, and other disciplines Each approach has its own rationale for finding a solution The present financial and economic crisis is making Taiwan's jobless rate worse. "The Bureau of Employment and Vocational Training, Council of Labour Affairs of Executive Yuan has been actively implementing Employment Service Outreach Programme to lower the unemployment rate in order to address this challenging issue". As part of the Employment Service Outreach Programme, outreach workers are hired, trained, and supervised to carry out tasks like locating unemployed people and then providing them with job information, utilising social resources to expand employment opportunities, and holding employer forums. or job-hunting classes, for example. This study uses "the decision-making trial and evaluation laboratory approach to develop the causal linkages among the criteria for assessing outreach people as well as to assess the significance of the criteria". The findings indicate that when the effectiveness of the outreach staff in the Employment Service Outreach Programme is assessed, the identification of the number of jobless persons and the number of follow-up visits are the two most crucial factors within the category of job-seeking service. 2010 Companies must constantly integrate activities and resources across national boundaries in order to remain internationally efficient and competitive in the present borderless economy. In order to achieve this, businesses must be careful to choose the best global manager and to increase their management abilities. A competency model, however, frequently includes a long list of different abilities. Anyone can find it challenging to concurrently grasp a diverse range of abilities. In order to successfully enable competency development, it becomes crucial to partition a collection of capabilities into certain significant parts. Additionally, in order to address this issue, the problem of integrating collective decision-making in ambiguous situations must be resolved

3. MATERIAL AND METHOD

Neutral for furnishing: The use of furniture and décor in neutral colours, tones, and styles is referred to as neutral furnishing. Standard neutral hues include various white, beige, grey, and earthy tones. The aesthetic of tranquil, harmonised furnishings allows for interior design flexibility and adaptation. The option to alter the floor plan: A room seems more unified and uniformly styled when all the furniture is neutral in colour and design. Because of the consistency, it is simpler to rearrange furniture and alter the floor plan without detracting from the room's overall look. Neutral furnishings provide as a blank canvas that may accommodate many spatial Apartments may be easily reconfigured thanks to neutral furnishings, which make this possible. It is easier to rearrange the furniture and décor in the room when there aren't any strong or overpowering colours present. Due to this versatility, homeowners may try out various floor layouts, such as moving furniture to create an open concept or separating huge sections into smaller, more efficient spaces. Modernization flexibility refers to a structure's or area's capacity to adjust to and take into account modifications in technology, fashion, and functioning through time. It entails including features, systems, and design components that can be quickly upgraded or adjusted to match changing demands and preferences. There are various important factors that influence modernisation flexibility study. Character flexibility: A place or structure's capacity to modify its aesthetic and design elements to suit various styles or themes is referred to as character flexibility. It entails including design components and attributes that can be quickly altered or customised to reflect shifting tastes or account for various purposes. Character flexibility in architecture and interior design has research implications in a number of important ways.

4. RESULTS AND DISCUSSION

TABLE 1. Direct relation array for Improving Housing Quality

	Neutral for furnishing	Possibility for change of floor plan	Possibility to reshape apartments	Modernization flexibility	Character flexibility	SUM
Neutral for furnishing	0	2	4	2	3	11
Possibility for change of floor plan	4	0	2	1	2	9
Possibility to reshape apartments	2	1	0	3	1	7
Modernization flexibility	1	3	2	0	2	8
Character flexibility	2	4	1	3	0	10

Table 1 illustrates a direct relationship matrix aimed at enhancing housing quality. It gauges the degree of connection or likeness among various factors or aspects associated with housing quality. Each cell within the table denotes the level of relationship between two factors, where higher values indicate stronger connections or similarities. The table showcases the direct relationships or similarities between diverse factors pertinent to

improving housing quality, while the "SUM" column offers a comprehensive view of the overall relationships or similarities among each factor and the others.

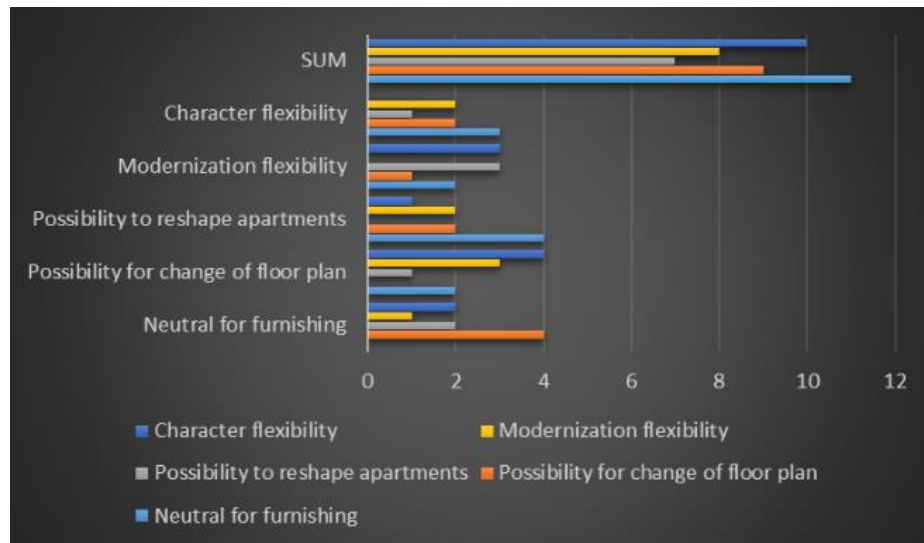


FIGURE 1. Direct relation array for Improving Housing Quality

Figure 1 depicts a direct relationship matrix with the objective of improving housing quality. It assesses the level of connection or similarity among different factors or aspects associated with housing quality. Each cell in the matrix represents the degree of relationship between two factors, with higher values indicating stronger connections or similarities. The figure highlights the direct relationships or similarities between various factors relevant to enhancing housing quality, while the "SUM" column provides a comprehensive overview of the overall relationships or similarities among each factor and the others.

TABLE 2. Normalization of Direct relation array for Improving Housing Quality

0	0.181818	0.363636	0.181818	0.272727
0.363636	0	0.181818	0.090909	0.181818
0.181818	0.090909	0	0.272727	0.090909
0.090909	0.272727	0.181818	0	0.181818
0.181818	0.363636	0.090909	0.272727	0

Table 3 displays the total relation matrix generated using the DEMATEL method. The matrix is obtained by applying the formula $T = Y(I-Y)^{-1}$, where Y represents the analysed matrix, and I is the identity matrix. This table provides a comprehensive view of the relationships and influences among the factors analysed, with higher values indicating stronger interdependencies.

TABLE 4. RI and CI

Components for improving house quality	Ci	Ri
Neutral for furnishing	4.530472	5.208797
Possibility for change of floor plan	4.82141	4.621622
Possibility to reshape apartments	4.51369	3.54637
Modernization flexibility	4.416534	4.006359
Character flexibility	4.052818	4.951775

Table 4 showcases the C_i and R_i values derived from the DEMATEL method for components pertaining to the enhancement of house quality. C_i reflects the significance or impact of each component, whereas R_i indicates the level of interdependence with other components. The table provides specific C_i and R_i values for factors like neutral for furnishing, possibility for change of floor plan, possibility to reshape apartments, modernization flexibility, and character flexibility.

TABLE 5. Calculation of $RI+CI$ and $RI-CI$ to get the cause and effect.

Components for improving house quality	$RI+CI$	$RI-CI$	Rank	Identity
Neutral for furnishing	9.739269	0.678325	1	cause
Possibility for change of floor plan	9.443031	-0.19979	2	effect
Possibility to reshape apartments	8.06006	-0.96732	5	effect
Modernization flexibility	8.422894	-0.41017	4	effect
Character flexibility	9.004593	0.898958	3	cause

Table 5 presents the values derived from the calculations of RI+CI and RI-CI, which determine the cause-and-effect relationships among components related to improving house quality. The RI+CI values represent the combined effect or influence of each component. Components such as neutral for furnishing, possibility for change of floor plan, possibility to reshape apartments, modernization flexibility, and character flexibility have RI+CI values of 9.7392687, 9.4430313, 8.0600601, 8.4228935, and 9.0045928, respectively. The RI-CI values indicate the causal effect or impact of each component. Components such as neutral for furnishing, possibility for change of floor plan, possibility to reshape apartments, modernization flexibility, and character flexibility have RI-CI values of 0.6783254, -0.199788, -0.9673203, -0.4101749, and 0.8989578, respectively. The table also includes the ranking of each component based on the RI+CI values, where the components are ranked as follows: neutral for furnishing (1), possibility for change of floor plan (2), character flexibility (3), modernization flexibility (4), and possibility to reshape apartments (5). In Table 5, the component labelled "Neutral for furnishing" is categorized as a cause, while the component labelled "Possibility for change of floor plan" is classified as an effect. Similarly, the component labelled "Possibility to reshape apartments" is identified as an effect, and "Modernization flexibility" is also categorized as an effect. Lastly, the component labelled "Character flexibility" is recognized as a cause.

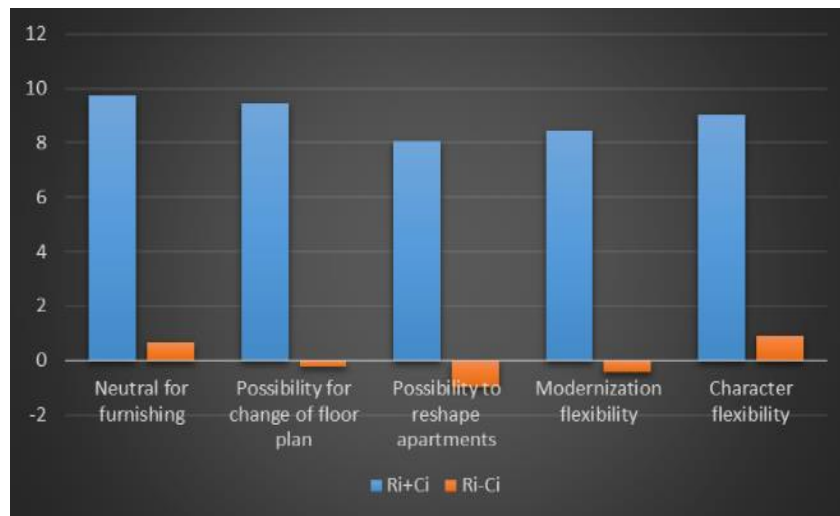


FIGURE 2. RI+CI and RI-CI

Figure 2 illustrates the results obtained from the calculations of RI+CI and RI-CI, which determine the cause-and-effect relationships among components aimed at improving house quality. The RI+CI values represent the combined influence or impact of each component. Specifically, the components—neutral for furnishing, possibility for change of floor plan, possibility to reshape apartments, modernization flexibility, and character flexibility—yield RI+CI values of 9.7392687, 9.4430313, 8.0600601, 8.4228935, and 9.0045928, respectively. On the other hand, the RI-CI values indicate the causal effect or impact of each component. The components—neutral for furnishing, possibility for change of floor plan, possibility to reshape apartments, modernization flexibility, and character flexibility—generate RI-CI values of 0.6783254, -0.199788, -0.9673203, -0.4101749, and 0.8989578, respectively.

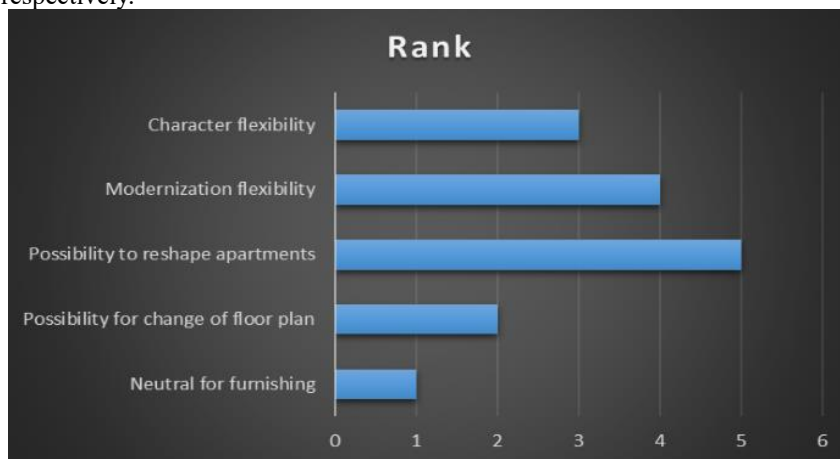


FIGURE 3. Rank

Figure 3 depicts the ranking of each component based on their RI+CI values, providing insight into their relative importance and influence in relation to enhancing house quality. Components are assigned ranks according to their RI+CI values, with the component having the highest RI+CI value receiving the top rank (1), the next-highest receiving rank 2, and so forth. The ranking order of the components based on their RI+CI values is as follows: "Neutral for furnishing" (1), "Possibility for change of floor plan" (2), "Character flexibility" (3), "Modernization flexibility" (4), and "Possibility to reshape apartments" (5). This ranking order implies that "Neutral for furnishing" holds the highest level of influence among the components, followed by "Possibility for change of floor plan," "Character flexibility," "Modernization flexibility," and finally, "Possibility to reshape apartments." By considering the ranks derived from the combined effect (RI+CI), we gain a relative comparison among the components, enabling a better understanding of their significance in the context of improving house quality.

5. CONCLUSION

To improve the overall quality of your home, several considerations must be taken into account. The first and foremost priority should be ensuring that the entire house is adequately insulated. A comfortable interior atmosphere may be maintained, and energy efficiency can be considerably increased by upgrading the insulation in walls, the attic, and the flooring. Windows and doors are essential for enhancing the condition of a residence. Reduce draughts and increase insulation with the installation of energy-efficient windows and doors with low-emissivity coatings, leading to higher energy savings and overall comfort. Ability to Adapt to Changing Needs: Living conditions and wellbeing: Flexibility in housing design can enhance liability. Sustainable and Efficient Affordability and Cost-effectiveness: Adaptability and Disaster Reduction to achieve their objectives, people and organisations must decide which course of action is best given the circumstances. Almost every academic discipline is represented in the multidisciplinary subject of decision-making research. Utilising scientific techniques is equally crucial as using intelligence, intuition, and experience in decision-making. neutral for the decoration, the potential for a different floor plan, changing the form of apartments, flexibility in modernization, Flexibility of character and flexibility of floor plan have taken the top two spots. The least desirable neutral for furnishings

REFERENCES

- [1]. Fänge, Agneta, and Susanne Iwarsson. "Changes in accessibility and usability in housing: an exploration of the housing adaptation process." *Occupational therapy international* 12, no. 1 (2005): 44-59.
- [2]. Bradley, Robert H., and Diane L. Putnick. "Housing quality and access to material and learning resources within the home environment in developing countries." *Child development* 83, no. 1 (2012): 76-91.
- [3]. Wu, Wei-Wen, and Yu-Ting Lee. "Developing global managers' competencies using the fuzzy DEMATEL method." *Expert systems with applications* 32, no. 2 (2007): 499-507.
- [4]. Tamilselvi, R., K. S. Mohanasathiya, and S. Prasath. "Developed a Smooth Support Vector Machine to Predict the Crop Production in Alluvial Soil and Red Soil Regions of Tamil Nadu India [J]." *Naturalista Campano* 28, no. 1 (2024): 279-297.
- [5]. Shieh, Jiunn-I., Hsin-Hung Wu, and Kuan-Kai Huang. "A DEMATEL method in identifying key success factors of hospital service quality." *Knowledge-Based Systems* 23, no. 3 (2010): 277-282.
- [6]. Daniel, Jay. "Developing a conceptual model to evaluate green suppliers: decision making method using DEMATEL." Daniel, J., & Talaei-Khoei, A. (2016). *Developing a Conceptual Model to Evaluate Green Suppliers: Decision Making Method using DEMATEL*. Paper presented at the AMCIS (2016).
- [7]. Asgari, Nasrin, and Soroush Avakh Darestani. "Application of multi-criteria decision-making methods for balanced scorecard: a literature review investigation." *International Journal of Services and Operations Management* 27, no. 2 (2017): 262-283.
- [8]. Dandasi, Varun Venkatesh, Suresh Deepak Gurubasannavar, and Raghavendra Sunku. "ENHANCING SMART GRID SECURITY: A MULTI-CRITERIA EVALUATION THROUGH GRA METHOD." *Management* 14, no. 2: 153-167.
- [9]. Mustare, Narendra, and V. Sreelathareddy. "Development of automatic identification and classification system for malaria parasite in thin blood smears based on morphological techniques." In *2017 IEEE International Conference on Power, Control, Signals and Instrumentation Engineering (ICPCSI)*, pp. 3006-3011. IEEE, 2017.
- [10]. Asgari, Nasrin, and Soroush Avakh Darestani. "Application of multi-criteria decision-making methods for balanced scorecard: a literature review investigation." *International Journal of Services and Operations Management* 27, no. 2 (2017): 262-283.

- [11]. Tamilselvi, R., and V. Kathiresan. "Energy competent transmission mechanism-based routing approach (ECTM-MRA) for reliable video transmission in multimedia vehicular ad-hoc networks." *ARPN Journal of Engineering and Applied Sciences* 13, no. 5 (2018): 1791-1801.
- [12]. Rakesh Mittapally, "Data-Driven Prediction of Mechanical Properties in 3D-Printed Composites Using Hybrid Machine Learning Models." *Journal of Data Science and Information Technology* 2, no. 2 (2025): 1-16.
- [13]. Pelissari, Renata, Sharfuddin Ahmed Khan, and Sarah Ben-Amor. "Application of Multi-Criteria Decision-Making Methods in Sustainable Manufacturing Management: A Systematic Literature Review and Analysis of the Prospects." *International Journal of Information Technology & Decision Making* 21, no. 02 (2022): 493-515.
- [14]. SABOKBAR, Hassanali Faraji, Behzad NADI, and Mohammad Rezaei NARIMISA. "Explaining and Zoning the Vulnerability of the Sixth City of Tehran During and after the Earthquake." *Astra Salvensis* (2018).
- [15]. Chauhan, Ankur, Harpreet Kaur, Sachin Yadav, and Suresh Kumar Jakhar. "A hybrid model for investigating and selecting a sustainable supply chain for agri-produce in India." *Annals of Operations Research* 290 (2020): 621-642.
- [16]. Aka, Venkata Pavan Kumar, and Kiran Kumar Mandula Samuel. "Adoption of SAP FSCM–Enhancing Collections and Dispute Processes in Spain, Portugal, and UK Operations." *International Journal of Information Technology and Management Information Systems (IJITMIS)* 15, no. 2 (2024): 148-161.
- [17]. Sunku, Raghavendra. "Data Intelligence for Workforce Management: Machine Learning Models for Payroll and Resource Optimization." *International Journal of Artificial intelligence and Machine Learning* 3, no. 3 (2025): 1-7.
- [18]. Liu, Yupeng, Yutao Yang, Yue Liu, and Gwo-Hshiung Tzeng. "Improving sustainable mobile health care promotion: a novel hybrid MCDM method." *Sustainability* 11, no. 3 (2019): 752.
- [19]. Jiang, Guang-Jun, Cheng-Geng Huang, Arman Nedjati, and Mohammad Yazdi. "Discovering the sustainable challenges of biomass energy: a case study of Tehran metropolitan." *Environment, Development and Sustainability* (2023): 1-36.
- [20]. Ansari, Ramin, Parisa Dehghani, Mahdi Mahdikhani, and Jaewook Jeong. "A Novel Safety Risk Assessment Based on Fuzzy Set Theory and Decision Methods in High-Rise Buildings." *Buildings* 12, no. 12 (2022): 2126.
- [21]. EHTESHAM, RASI REZA. "Using DEMATEL Method to Develop Conceptual Model for Evaluating Green Suppliers." (2016): 55-70.
- [22]. Mehregan, Mohammad Reza, Seyed Mostafa Razavi, and ANVARI MOHAMMAD REZA AKHAVAN. "Identification and evaluation of strategic decisions in gas industry using DEMATEL method." (2012): 49-65.
- [23]. Li, Songrui, and Yitang Hu. "A multi-criteria Framework to Evaluate the Sustainability of Renewable Energy: A 2-Tuple Linguistic Grey Relation Model from the Perspective of the Prospect Theory." *Sustainability* 14, no. 8 (2022): 4419.
- [24]. Vidhya Prasanth, M Ramachandran, Ramya sharma, Chinnaasami Sivaji, Solving the Conveyor Selection Problems in a Manufacturing Industry with the Grey Relational Analysis (GRA) Technique" *Aeronautical and Aerospace Engineering*, 1(4), December 2023, 32-38.
- [25]. Ramesh, Gopisetty, Narendra B. Mustare, and K. Uday C. Pramod Kumar. "Development of e-stick for blind persons using IoT." *I-Manager's Journal on Embedded Systems* 10, no. 2 (2022).
- [26]. Jeong, Jin Su. "Biomass feedstock and climate change in agroforestry systems: Participatory location and integration scenario analysis of biomass power facilities." *Energies* 11, no. 6 (2018): 1404.
- [27]. Hashemi-Dehaghi, Zahra, Hamed Karimi-Shirazi, and Masoom NIKBAKHT. "Identifying Effective Factors on Surgery Cancellation and Providing Effective Solutions Using Improved Management Strategies in a Selected Hospital: A Case Study." *Health Information Management* 16, no. 4 (2019): 176-183.
- [28]. Vahedi, Manoucher, and Mohammad Mehdi Movahedi. "Evaluating and Prioritizing Asset Management Excellence Model Based on Critical Criteria Using the Combination of DEMATEL and ANP Techniques." *Petroleum Business Review* 2, no. 3 (2018): 56-65.
- [29]. Aka, Venkata Pavan Kumar, and Kiran Kumar Mandula Samuel. "Predictive Modeling for Brownfield Migration from SAPECC 6.0 To S4HANA A Machine Learning Approach for Effort Evaluation Under the SAP Rise Program." *International Journal of Computer Engineering and Technology (IJCET)* 14, no. 1 (2023): 232-248.
- [30]. Tamilselvi, R., and V. Kathiresan. "Bandwidth aware multipath geographic routing protocol (Bamgrp) for reliable video transmission in multimedia vehicular." *Ad-Hoc Networks* 9, no. 4 (2017): 2779-2787.
- [31]. Devadoss, A. Victor, and A. Felix. "A Fuzzy DEMATEL approach to study cause and effect relationship of youth violence." *International Journal of Computing Algorithm* 2 (2013): 363-372.
- [32]. Jeong, Jin Su, and David González-Gómez. "Assessment of sustainability science education criteria in online-learning through fuzzy-operational and multi-decision analysis and professional survey." *Heliyon* 6, no. 8 (2020): e04706.
- [33]. Manjula selvam, Vidhya Prasanth, M. Ramachandran, Ramya Sharama, "A Study on Economic Models of Animal Communication Methods" *Journal on Innovations in Teaching and Learning*, 3(2), June 2024, 13-19.
- [34]. Rakesh Mittapally. "Assessing Normality in Healthcare Expenditure Data: A Shapiro-Wilk Test Approach In P"thons." *International Journal of Computer Science and Data Engineering* 2, no. 4 (2025): 1-8.
- [35]. Pandey, Mamta, Ratnesh Litoriya, and Prateek Pandey. "Application of fuzzy DEMATEL approach in analyzing mobile app issues." *Programming and Computer Software* 45 (2019): 268-287.