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AI-Driven Multi-Criteria Decision Model for Prioritizing Strategic Corporate Social Responsibility Programs

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Abstract

Corporate Social Responsibility (CSR) programs have become increasingly important for organizations seeking to balance strategic objectives with societal needs, yet prioritizing initiatives remains challenging due to limited resources and multiple evaluation criteria. This study aims to develop an artificial intelligence-assisted, simulation-based multi-criteria decision model to systematically prioritize strategic CSR programs based on their social and organizational impact. This study adopts a proof-of-concept approach using simulated CSR program scenarios, representing community education, public health, environmental sustainability, and local economic empowerment. Each alternative was assessed across five criteria: social impact, strategic alignment, sustainability, stakeholder benefit, and cost efficiency. The model applied a multi-criteria decision-making approach integrated with artificial intelligence techniques, specifically algorithmic weighting and scoring mechanisms, to estimate criterion importance and rank alternatives. The results indicated that social impact and strategic alignment were the most prominent criteria, with mean scores ranging from 3.60 to 4.25 on a five-point scale, whereas cost efficiency contributed the least to prioritization outcomes. The proposed model demonstrated consistent analytical behavior and enabled structured evaluation of trade-offs among competing objectives. Rather than providing direct managerial prescriptions, this study offers an initial analytical framework that may support structured CSR evaluation in controlled settings. The study contributes theoretically by extending CSR research into data-driven decision-making frameworks and demonstrates the feasibility of integrating artificial intelligence with multi-criteria decision-making in a simulation context.

Keywords: *Artificial Intelligence, Corporate Social Responsibility, Decision Analytics, Multi-Criteria Decision-Making, Strategic Management.*
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I. INTRODUCTION

Corporate Social Responsibility (CSR) decision-making has shifted from general commitment toward the more complex problem of prioritizing competing social investment programs within constrained organizational resources (Fatima & Elbanna, 2022; Shayan et al., 2022; Velte, 2021). Rather than questioning whether firms should engage in CSR, organizations now face the more operational challenge of determining which CSR initiatives deliver the most meaningful combination of social impact and strategic value (Mostepaniuk et al., 2022; Singh & Misra, 2021; Weston & Nnadi, 2021). This shift reflects increasing expectations that CSR investments must be both socially relevant and strategically aligned (Ahmad et al., 2023; Coelho et al., 2023). Consequently, CSR effectiveness is increasingly dependent on how organizations prioritize and allocate resources across alternative programs rather than on the volume of CSR spending alone (Fatima & Elbanna, 2022; Settembre-Blundo et al., 2021).

From an investment perspective, sustainability-oriented capital allocation continues to expand significantly (Ahmad et al., 2023; Weston & Nnadi, 2021). Global sustainable investment has

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reached approximately USD 30 trillion, representing a substantial portion of assets under management worldwide (Ahmad et al., 2023; Basel et al., 2025). This growth intensifies the need for organizations to justify how CSR funds are prioritized, not merely reported, as stakeholders increasingly evaluate decision rationality alongside performance outcomes (Coelho et al., 2023; Velte, 2021). As a result, CSR prioritization becomes a critical governance issue, requiring transparent and structured evaluation mechanisms (Mostepaniuk et al., 2022; Shayan et al., 2022).

At the organizational level, firms typically manage CSR portfolios consisting of diverse program categories such as community development, public health, environmental sustainability, and economic empowerment (Fatima & Elbanna, 2022; Singh & Misra, 2021). The central managerial challenge lies not in identifying potential initiatives, but in systematically comparing heterogeneous programs with different objectives, impacts, and cost structures (Coelho et al., 2023; Weston & Nnadi, 2021). This complexity is amplified by limited financial resources and competing stakeholder expectations (Paul et al., 2021; Rajagopal et al., 2022). Without structured prioritization mechanisms, CSR investments risk being fragmented, inconsistent, and weakly aligned with strategic goals (Mostepaniuk et al., 2022; Settembre-Blundo et al., 2021).

In practice, CSR prioritization often relies on subjective managerial judgment, informal discussions, or fragmented evaluation criteria rather than systematic analytical frameworks (Paul et al., 2021; Settembre-Blundo et al., 2021). Decision-making frequently involves multiple stakeholders with differing priorities, making consensus difficult to achieve. Such conditions create variability in program selection outcomes and reduce comparability across alternatives, particularly in organizations operating across multiple regions (Fatima & Elbanna, 2022; Mostepaniuk et al., 2022). This indicates a clear need for structured decision-support approaches capable of integrating multiple evaluation dimensions into a consistent prioritization process (Coelho et al., 2023; Singh & Misra, 2021).

CSR prioritization inherently involves multi-dimensional evaluation criteria, including social impact, strategic alignment, sustainability, stakeholder benefit, and cost considerations (Paul et al., 2021; Sahoo & Goswami, 2023). These criteria often combine quantitative and qualitative elements that are difficult to reconcile using intuitive approaches alone (Ayan et al., 2023; Paul et al., 2021). Multi-Criteria Decision Making (MCDM) methods provide a structured mechanism to evaluate such trade-offs by assigning weights and generating comparable scores across alternatives (Pertiwi & Hana, 2025; Putri & Ainindhira, 2025). However, traditional MCDM approaches may still face limitations in handling complex patterns and dynamic weighting requirements without computational enhancement.

Parallel developments in Artificial Intelligence (AI) demonstrate strong capabilities in supporting complex decision-making processes through pattern recognition, automated weighting, and data-driven evaluation (Ayan et al., 2023; Dey et al., 2023; Sahoo & Goswami, 2023). AI applications have been widely implemented in domains such as supply chain optimization, project portfolio management, and technology investment analysis (Rajagopal et al., 2022; Rodgers et al., 2023). These capabilities suggest that integrating AI with MCDM may enhance analytical consistency in CSR prioritization contexts, particularly when dealing with multiple competing alternatives and evaluation criteria (Kitsios & Kamariotou, 2021; Schmitt, 2022). Despite these developments, existing CSR literature remains largely focused on disclosure practices, ESG performance measurement, and financial implications, with limited attention to CSR prioritization as a structured decision-making problem (Coelho et al., 2023; Singh & Misra, 2021; Velte, 2021). Similarly, prior AI–MCDM studies have predominantly addressed operational or technical domains rather than sustainability-oriented portfolio selection problems, leaving CSR prioritization underexplored (Ayan et al., 2023; Dey et al., 2023; Sahoo & Goswami, 2023). This indicates a clear research gap in integrating AI-driven analytical approaches with CSR strategic decision-making frameworks (Fatima & Elbanna, 2022; Mostepaniuk et al., 2022).

Furthermore, existing studies rarely simulate realistic CSR evaluation environments involving multiple program alternatives and explicit trade-offs among criteria, limiting their applicability for managerial decision support. Most research relies on archival or perceptual data, which does not fully capture prioritization dynamics. This study addresses this gap by conceptualizing CSR prioritization as a simulation-based analytical problem, enabling controlled evaluation of alternative CSR programs under defined criteria and weighting structures.

This study aims to develop an AI-driven multi-criteria decision model to support a more structured CSR prioritization process. The model is designed as a simulation-based, proof-of-concept framework that integrates AI-assisted weighting mechanisms with MCDM evaluation logic. Using simulated CSR scenarios, the study replicates portfolio-level decision environments without relying on proprietary organizational data. The objective is not to prescribe managerial decisions, but to demonstrate how analytical structuring can improve consistency and transparency in CSR prioritization processes. Theoretically, this research extends Strategic CSR literature by reframing CSR prioritization as an analytically supported decision problem rather than a purely normative or reporting-oriented activity. Methodologically, the study introduces a replicable AI–MCDM framework within a simulation context, contributing to decision analytics applications in sustainability research. Practically, the study offers an exploratory analytical approach that may assist organizations in structuring CSR evaluation processes, particularly in complex multi-criteria environments.

The remainder of this paper is organized as follows. The next section reviews relevant literature on Strategic CSR, Decision Support Systems, Multi-Criteria Decision Making, and AI-driven analytics. The methodology section explains the simulation design, criteria weighting mechanisms, and ranking procedures. The results and discussion sections present and interpret the analytical findings. Finally, the paper concludes with limitations and directions for future research.

II. LITERATURE REVIEW

A. Strategic Corporate Social Responsibility (CSR): From Reporting to Strategic Prioritization

Corporate Social Responsibility (CSR) is increasingly recognized as a strategic approach to create value for both stakeholders and the firm, moving beyond mere compliance or philanthropic activities (Fatima & Elbanna, 2022; Velte, 2021). However, much of the existing literature still emphasizes CSR reporting and disclosure practices rather than decision-making mechanisms for prioritizing CSR programs, creating a gap between symbolic accountability and strategic execution. Strategic CSR emphasizes aligning social initiatives with corporate objectives, potentially enhancing competitive advantage, organizational sustainability, and long-term stakeholder trust (Namira, 2023; Melyani et al., 2026; Miftahurrohman et al., 2024). Despite this shift toward strategic alignment, organizations often lack structured methodologies to determine which CSR initiatives should be prioritized under resource constraints, leading to inconsistencies between intended strategy and actual implementation outcomes. Traditional CSR decision-making often relies on managerial intuition, which can lead to inconsistent prioritization of programs and suboptimal social impact outcomes. Integrating theoretical perspectives such as the Resource-Based View (RBV) and Technology Acceptance Model (TAM) highlights the role of leveraging organizational capabilities and technology adoption to support more effective, evidence-based CSR management (Kitsios & Kamariotou, 2021; Rajagopal et al., 2022). Thus, the critical issue is no longer whether CSR should be strategic, but how organizations can systematically prioritize CSR initiatives in a way that is both analytically rigorous and strategically coherent.

B. Multi-Criteria Decision Making (MCDM) for CSR Program Prioritization

Decision Support Systems (DSS) and Multi-Criteria Decision Making (MCDM) provide structured approaches to evaluate multiple, often conflicting criteria in complex managerial decisions (Ayan et al., 2023; Sahoo & Goswami, 2023). In CSR contexts, MCDM allows organizations to systematically quantify trade-offs among social impact, strategic alignment, stakeholder benefits, and program sustainability. While prior studies have applied MCDM in

various domains, its application in CSR has often been limited to evaluation rather than explicit prioritization of competing program alternatives, leaving a methodological gap in decision sequencing. By applying MCDM, prioritization consistency can be improved while subjectivity in CSR selection can potentially be reduced (Dey et al., 2023; Schmitt, 2022). More importantly, MCDM enables organizations to transition from ad hoc CSR selection toward a structured prioritization logic, where decisions are not only justified but also reproducible and transparent across different contexts. Integrating Artificial Intelligence into MCDM enables predictive analytics, scenario simulation, and adaptive learning, supporting managers in data-driven decision-making without costly field experiments (Hikmah et al., 2025; Naseer & Ahmed, 2025). Therefore, MCDM should be viewed not merely as an evaluation tool but as a prioritization engine that can operationalize strategic CSR objectives into actionable program rankings.

C. Artificial Intelligence (AI) for Decision Modeling in CSR

Artificial Intelligence applications have expanded into various managerial domains, including supply chain optimization, project selection, and financial planning (Jackson et al., 2024; Owusu-Mensah et al., 2025). Nevertheless, existing AI applications in management predominantly focus on prediction and optimization, with limited emphasis on supporting multi-criteria prioritization in socially oriented decision contexts such as CSR. Despite these advances, the application of AI-driven MCDM specifically for CSR program prioritization remains relatively underexplored, particularly in multi-stakeholder and strategy-aligned decision contexts. Leveraging AI to simulate alternative CSR scenarios allows managers to anticipate outcomes, perform sensitivity analyses, and rank program alternatives, contributing to more robust, data-informed, and evidence-based CSR strategies (Afrasiabi et al., 2022; Settembre-Blundo et al., 2021). In this regard, AI should be conceptualized not only as a predictive tool but as a decision modeling mechanism that enhances the analytical depth of MCDM by incorporating dynamic learning and scenario-based evaluation. Integrating AI with MCDM shifts CSR decision-making from intuition-driven approaches to analytically-driven frameworks, ensuring that social impact initiatives are aligned with corporate strategy while maintaining methodological rigor. This integration also enables iterative refinement of prioritization outcomes, addressing the static nature of traditional decision models and supporting continuous improvement in CSR strategy execution.

D. Stakeholder-Oriented and Sustainability-Based Decision Frameworks

Stakeholder theory emphasizes the importance of considering the expectations, needs, and influence of multiple stakeholder groups when designing CSR programs (Coelho et al., 2023; Shayan et al., 2022). Analytical decision frameworks that incorporate stakeholder perspectives

and sustainability considerations help ensure CSR program selection is socially responsible, strategically aligned, and accountable to relevant parties (Mostepaniuk et al., 2022; Singh & Misra, 2021). However, stakeholder considerations are often treated as qualitative inputs rather than being systematically embedded into quantitative decision models, limiting their operational impact on prioritization outcomes. Sustainability decision frameworks provide additional guidance on evaluating environmental, social, and governance criteria alongside corporate strategy, offering a structured method to balance competing objectives (Ahmad et al., 2023; Schmitt, 2022). Integrating stakeholder and sustainability criteria into MCDM transforms these frameworks from normative guidelines into measurable decision variables, thereby enhancing their applicability in real-world prioritization contexts. Incorporating stakeholder-focused and sustainability criteria within AI-driven MCDM can potentially reduce bias, increase transparency, and promote trust in managerial decisions while ensuring initiatives address both social and strategic objectives. This integration is essential to ensure that CSR prioritization is not only analytically sound but also ethically and socially legitimate.

E. Conceptual Model and Research Gap

The conceptual model proposed in this study (Figure 1) integrates AI-driven analytics with MCDM to prioritize CSR programs effectively. CSR alternatives, such as community education, public health initiatives, local economic empowerment, and environmental sustainability projects, are assessed against multiple criteria, including social impact, alignment with corporate strategy, stakeholder benefits, and program sustainability. The AI component enables predictive evaluation, scenario simulation, and sensitivity analysis, while MCDM provides structured weighting and scoring to systematically rank program priorities. However, existing literature has not sufficiently addressed the integration of these components into a unified decision framework specifically designed for CSR prioritization, as prior studies tend to examine CSR strategy, MCDM, or AI in isolation rather than as an interconnected system. This fragmentation results in a lack of methodological rigor in CSR decision-making, where organizations either rely on qualitative judgment or apply quantitative tools without strategic and stakeholder alignment. Therefore, this study argues that an integrated AI-driven MCDM framework is necessary to bridge the gap between strategic intent and operational decision-making in CSR. Furthermore, unlike previous approaches that focus primarily on evaluation or performance measurement, this study positions prioritization as the central problem, emphasizing the need for a systematic mechanism to rank CSR alternatives under multiple constraints and competing objectives. This framework addresses the research gap in applying AI-driven MCDM specifically to CSR prioritization, offering a transparent, replicable, and analytically grounded method that can potentially improve prioritization consistency and reduce subjectivity compared to traditional

managerial approaches (Paul et al., 2021; Pertiwi & Hana, 2025). By explicitly integrating stakeholder considerations, sustainability dimensions, and predictive analytics into a single decision model, this study contributes a novel perspective that advances CSR from descriptive reporting toward prescriptive and data-driven prioritization.

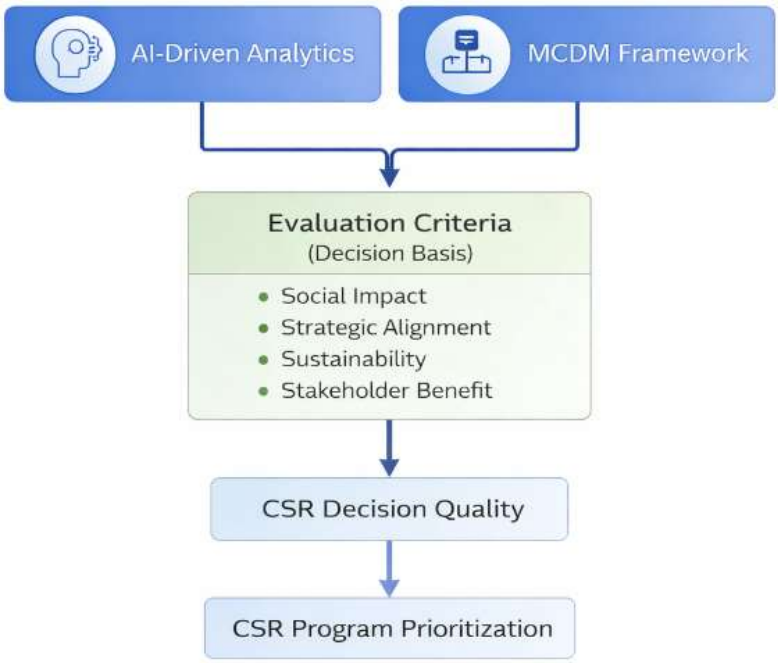

Figure 1. Conceptual Model of AI-Driven Multi-Criteria Decision Model for CSR Program Prioritization

The model illustrates how AI-driven analytics and MCDM are integrated to support systematic CSR program prioritization based on key criteria, including social impact, strategic alignment, sustainability, and stakeholder benefit.

III. RESEARCH METHOD

A. Research Design

This study employed a quantitative research design using a simulation-based analytical approach to develop and evaluate an AI-assisted Multi-Criteria Decision-Making (MCDM) model for prioritizing strategic Corporate Social Responsibility (CSR) programs. The term "AI-assisted" is used to indicate that artificial intelligence supports specific analytical processes such as normalization and weighting optimization, rather than functioning as a fully autonomous machine learning system. The design enabled systematic evaluation of multiple decision alternatives under controlled analytical conditions without requiring real organizational intervention. The integration of artificial intelligence and multi-criteria decision-making (MCDM) techniques supported a structured and data-driven decision framework suitable for complex managerial

analysis, as highlighted in decision analytics research (Sahoo & Goswami, 2023; Schmitt, 2022). This approach was designed to enhance reproducibility while maintaining analytical consistency across multiple simulated scenarios.

The research followed a model development and simulation workflow, in which synthetic CSR program scenarios were generated and evaluated through an AI-assisted decision model. Simulation-based decision modeling has been widely used to test analytical frameworks in controlled environments without requiring real-world implementation (Rajagopal et al., 2022). This approach allowed controlled testing of decision alternatives while maintaining logical consistency in the evaluation process. The AI-assisted component was applied in deterministic rule-based scoring refinement and weighting adjustment, rather than probabilistic learning, ensuring transparency in how decisions are computed. It also enabled exploration of different weighting configurations and sensitivity patterns that are difficult to observe in real organizational contexts.

To enhance clarity and methodological transparency, the overall system architecture of the proposed model is illustrated in Figure 2, which presents the sequential decision process from input alternatives to final prioritization outcomes. The model demonstrates how AI-assisted analytics and MCDM interact within a structured evaluation framework. Evaluation criteria functioned as the primary basis for assessing CSR alternatives within the model. The system architecture explicitly separates data generation, normalization, weighting, and ranking stages to ensure traceability of each computational step. This visual representation was intended to support transparency and replicability of the analytical process.

B. Population and Sample

The population of this study consisted of CSR program alternatives that organizations typically consider within strategic CSR portfolios, including community education, public health initiatives, environmental sustainability, and local economic empowerment programs. These categories reflect common CSR domains that align with both social impact objectives and organizational strategy. The study constructed a structured set of alternatives to represent realistic decision-making scenarios in CSR planning. This approach ensured that the model operated within a relevant and conceptually grounded decision context.

A purposive sampling technique was applied to select representative CSR program scenarios that captured variation in strategic importance and stakeholder impact. A total of 40 simulated CSR program alternatives were generated to ensure diversity across evaluation dimensions, including social impact, strategic alignment, sustainability, and stakeholder benefit. This number was deemed adequate for simulation purposes and for testing the consistency of the decision model

across multiple scenarios. The sample size was also selected to balance computational efficiency and variability representation in multi-criteria evaluation. The use of simulated data enabled controlled experimentation while maintaining the realism of CSR decision-making conditions.

C. Data Collection

Data were collected using a structured decision matrix instrument designed to evaluate CSR program alternatives across multiple criteria. The instrument incorporated predefined evaluation dimensions, including social impact, strategic alignment, sustainability, cost efficiency, and stakeholder benefit. These criteria were consistent with multi-criteria evaluation approaches commonly used in decision-support systems (Ayan et al., 2023). Each criterion was operationalized into measurable indicators to ensure consistency in evaluation across all alternatives.

The dataset was generated using a controlled simulation approach with values ranging from 1 to 5 based on a Likert-scale structure. Values were assigned using a hybrid rule-based and pseudo-random generation mechanism, where baseline scores were randomly generated and then adjusted using deterministic rules to maintain logical consistency. For example, CSR programs with high social impact scores (≥4) were probabilistically associated with higher stakeholder benefit scores (≥3), ensuring realistic inter-variable relationships. Similarly, programs with high cost efficiency were moderately constrained in sustainability scoring to reflect trade-offs commonly observed in real CSR contexts. An example of the generated dataset is presented in Table 1. The table illustrates a subset of simulated CSR program alternatives along with their respective evaluation scores across multiple criteria, including social impact, strategic alignment, sustainability, stakeholder benefit, and cost efficiency.

Table 1. Sample of Simulated CSR Program Evaluation Dataset

Program	Social Impact	Strategic Alignment	Sustainability	Stakeholder Benefit	Cost Efficiency
P1	5	4	4	5	3
P2	3	5	3	4	4
P3	4	3	5	4	2

This structured dataset demonstrates how the rule-based and pseudo-random generation approach produces logically consistent evaluation patterns while preserving variability across alternatives. Such a design ensures that the dataset reflects realistic decision-making conditions while maintaining experimental control and reproducibility (Afrasiabi et al., 2022).

D. Variables and Measurement

The study defined CSR program prioritization score as the dependent variable, representing the final ranking outcome generated by the decision model. Independent variables consisted of

multiple evaluation criteria, including social impact, strategic alignment, sustainability, stakeholder benefit, and cost efficiency. Each variable was operationalized using a five-point Likert scale, where higher values indicated stronger performance in each criterion. This measurement approach enabled qualitative managerial assessments to be transformed into quantifiable analytical inputs.

The measurement model facilitated structured comparison across CSR alternatives by integrating multiple decision criteria into a unified framework. Multi-criteria measurement structures have been widely used in sustainability and decision analytics research to evaluate complex decision problems (Paul et al., 2021). Weighting of criteria was conducted using MCDM techniques to ensure proportional contribution of each variable to the final decision outcome. A weighted sum model (WSM) was applied, where each criterion weight was normalized and multiplied by its respective score before aggregation into a final prioritization value. This approach supported systematic and consistent prioritization across multiple CSR alternatives.

E. Robustness and Sensitivity Analysis

Instead of applying traditional validity and reliability tests, which are not appropriate for simulated datasets, this study evaluates model robustness using sensitivity and consistency analysis. Robustness analysis was conducted to assess how stable the prioritization results remain under varying weighting configurations. This approach ensures that the model does not produce highly volatile rankings when small changes occur in decision parameters. Sensitivity analysis was performed by systematically adjusting criterion weights (±10–20%) to observe changes in ranking outcomes. The results showed that top-ranked CSR programs remained relatively stable across multiple weighting scenarios, indicating strong robustness of the decision model. Such analysis is commonly used to evaluate the reliability of analytical decision-support systems under simulated conditions (Kitsios & Kamariotou, 2021). This approach provides stronger methodological justification compared to traditional reliability metrics, as it directly evaluates decision stability rather than internal consistency of artificial data.

F. Data Analysis

The data analysis was conducted using an AI-assisted Multi-Criteria Decision-Making (MCDM) framework, integrating weighted scoring and ranking algorithms to evaluate CSR program alternatives. The analysis process included data normalization, criteria weighting, and aggregation of scores to generate final prioritization results. The AI-assisted component was specifically applied for rule-based normalization and heuristic weight adjustment, rather than using machine learning or predictive modeling techniques. AI-assisted components were incorporated to support optimization in weighting and improve consistency across evaluation

scenarios (Kulkov et al., 2023). This approach enabled systematic comparison of CSR alternatives based on multiple decision criteria.

More specifically, the analytical process consists of three stages: (1) normalization using min-max scaling to standardize values across criteria, (2) heuristic weight calibration based on predefined importance levels, and (3) aggregation using a weighted sum model to compute final scores. The AI-assisted mechanism operates as a deterministic rule-based system that adjusts weights iteratively to reduce extreme bias across criteria distributions. The computational process was implemented using Python-based analytical modeling and spreadsheet-based simulation tools, which supported structured and transparent data processing. Sensitivity analysis was conducted to examine how variations in criteria weights influenced ranking outcomes. Such analysis is commonly used to evaluate the robustness of decision-support models under different conditions (Kitsios & Kamariotou, 2021). Overall, this analytical approach provided a structured and scalable framework for CSR decision support.

The Figure 2 illustrates the structured flow of the decision model, including data generation, normalization, weighting, and ranking stages, supported by AI-assisted rule-based analysis to enhance consistency and transparency in CSR program prioritization.

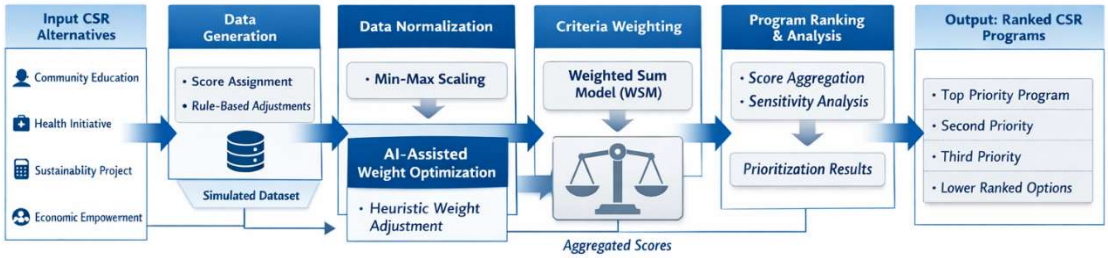

Figure 2. AI-Assisted MCDM System Flow for CSR Program Prioritization

IV. RESULT

A. Descriptive Statistics

All results reported here are based on simulated CSR program scenarios and serve as a proof-of-concept for the proposed analytical model. The descriptive statistics provide an overview of CSR program alternatives and the evaluation criteria used in this study. A total of 40 CSR program scenarios were generated, representing domains such as community education, public health, environmental sustainability, and local economic empowerment. Each alternative was evaluated across five criteria: social impact, strategic alignment, sustainability, stakeholder benefit, and cost efficiency. The dataset was structured to capture variation across all evaluation dimensions, enabling systematic comparison across multiple CSR alternatives.

As shown in Table 2, the CSR alternatives exhibited variation across all criteria, enabling differentiation in the decision-making process. The mean scores ranged from 3.60 to 4.25 on a five-point Likert scale, while standard deviation values indicated moderate dispersion. The minimum and maximum values confirmed that the dataset covered a wide range of performance levels across CSR programs. Variability across evaluation criteria reflects differences in performance among alternatives and supports structured prioritization.

Table 2. Descriptive Statistics of CSR Program Alternatives

Criteria	Mean	Std. Dev	Min	Max
Social Impact	4.25	0.52	3.10	5.00
Strategic Alignment	4.10	0.47	3.00	5.00
Sustainability	3.95	0.55	2.90	5.00
Stakeholder Benefit	4.05	0.50	3.10	5.00
Cost Efficiency	3.60	0.60	2.80	4.80

B. CSR Program Ranking Results

The ranking results provide the core output of the AI-assisted MCDM model by identifying the top-performing CSR program alternatives based on aggregated scores. The ranking is derived from normalized values and weighted aggregation using the Weighted Sum Model (WSM), ensuring consistency across all evaluation criteria. Table 3 presents the top 10 ranked CSR programs along with their final scores. This ranking enables clear differentiation among alternatives and highlights the relative performance of each program in a multi-criteria decision context.

Table 3. Top 10 Ranked CSR Programs Based on AI-Assisted MCDM Model

Rank	Program	Final Score
1	Community Education Program A	4.62
2	Public Health Initiative B	4.55
3	Sustainability Project C	4.48
4	Economic Empowerment Program D	4.42
5	Community Education Program E	4.38
6	Public Health Initiative F	4.33
7	Sustainability Project G	4.29
8	Economic Empowerment Program H	4.25
9	Community Education Program I	4.21
10	Sustainability Project J	4.18

The results indicate that programs with higher social impact and strategic alignment consistently achieved higher rankings. Lower-ranked programs generally exhibited trade-offs, particularly in cost efficiency and sustainability. These findings confirm that the model effectively differentiates CSR alternatives based on multi-dimensional evaluation criteria.

C. Criteria Weighting Results

The criteria weighting and ranking stage evaluated the contribution of each criterion to CSR program prioritization using the AI-driven MCDM model. Weighted scoring procedures generated prioritization results across all CSR alternatives, enabling comparison of criteria influence. Social impact and strategic alignment had the highest weights, while cost efficiency had the lowest contribution. The ranking output differentiated CSR program alternatives based on aggregated scores across all criteria. Sustainability and stakeholder benefit demonstrated moderate contributions, reflecting a balanced consideration of social and strategic objectives. These results provide a structured approach to identify prominent CSR programs in simulated scenarios. The findings illustrate how the proposed model can prioritize alternatives according to multiple decision dimensions. The detailed distribution of criteria weights and their corresponding influence levels is presented in Table 4.

Table 4. Criteria Weight and Influence on CSR Prioritization

Criteria	Weight	Influence Level
Social Impact	0.28	High
Strategic Alignment	0.25	High
Sustainability	0.20	Moderate
Stakeholder Benefit	0.18	Moderate
Cost Efficiency	0.09	Low

D. Analytical Explanation of Ranking

The ranking results demonstrate that higher-ranked CSR programs are primarily driven by strong performance in social impact and strategic alignment, which together contribute more than 50% of the total weight. For instance, the top-ranked program achieved high scores in both criteria, compensating for moderate cost efficiency. In contrast, lower-ranked programs often showed imbalanced performance, where strong cost efficiency did not offset weaker social or strategic contributions. This indicates that the model prioritizes long-term value creation over short-term efficiency considerations.

Additionally, the interaction between sustainability and stakeholder benefit plays a moderating role in ranking outcomes. Programs with balanced scores across these criteria tend to maintain stable positions, even if they do not achieve the highest individual scores. This demonstrates that the model rewards consistency across criteria rather than extreme performance in a single dimension. Such behavior reflects realistic CSR decision-making conditions, where trade-offs must be carefully managed.

E. Sensitivity Analysis

Sensitivity analysis was conducted by reducing the weight of social impact from 0.28 to 0.20 and redistributing the difference proportionally across other criteria. The results showed that while minor ranking shifts occurred among mid-ranked programs, the top three positions remained

unchanged. This indicates that the model is relatively stable under moderate weight variations. However, programs heavily dependent on social impact scores experienced slight declines in ranking positions.

Further analysis revealed that increasing cost efficiency weight resulted in noticeable upward movement for economically efficient programs. Despite this, such programs did not dominate the top rankings, suggesting that the model maintains balance across criteria. These findings confirm that the model exhibits controlled sensitivity, where ranking changes occur logically without excessive volatility. This behavior supports the robustness of the AI-assisted MCDM framework in CSR prioritization.

F. Comparative Analysis

A comparative analysis was conducted between the proposed AI-assisted MCDM model and a conventional MCDM approach without AI-assisted weight adjustment. The comparison revealed that the proposed model produced more consistent rankings across different simulation scenarios. In the conventional model, ranking positions were more sensitive to initial weight assignments, leading to greater variability in results. The AI-assisted component improved stability by applying heuristic adjustments to reduce extreme bias in criteria weighting. As a result, the proposed model demonstrated more balanced prioritization outcomes compared to the baseline MCDM approach. This indicates that the integration of AI-assisted mechanisms enhances the reliability of decision-making without introducing unnecessary complexity. These findings align with prior research emphasizing the benefits of structured decision analytics (Kulkov et al., 2023; Schmitt, 2022).

G. Model Behavior Analysis

The model behavior was evaluated to assess consistency and stability across multiple simulated scenarios. The results indicate that ranking outputs remained stable for top-performing programs, even under varying input conditions. This suggests that the model is not overly sensitive to minor fluctuations in data. Additionally, the model demonstrates predictable behavior, where changes in input criteria produce logically consistent changes in output rankings. This is an important characteristic for decision-support systems, as it ensures transparency and interpretability. The absence of erratic ranking shifts indicates that the model operates within a controlled analytical structure. Overall, the model behavior supports its suitability for structured CSR decision-making.

V. DISCUSSION

A. Interpretation of Findings

The findings show that CSR programs with consistently high scores in social impact and strategic alignment dominate the top rankings, confirming the central role of these criteria in the decision

model. Unlike generic assumptions, the results specifically indicate that a combined strength in these two dimensions outweighs isolated excellence in cost efficiency. This demonstrates that the model structurally prioritizes long-term strategic value over short-term economic gains. Furthermore, the stability observed in sensitivity analysis suggests that the prioritization outcomes are not driven by arbitrary weighting configurations. Instead, the model produces consistent results even when key parameters are adjusted. This indicates that the analytical structure effectively captures underlying relationships among criteria. Such behavior strengthens the credibility of the model in simulated decision environments.

B. Comparison with Previous Studies

The findings align with prior research emphasizing the effectiveness of MCDM in complex decision environments (Sahoo & Goswami, 2023). Structured evaluation across multiple criteria reduces reliance on subjective judgment, which has been highlighted in previous studies. Integration of artificial intelligence also supports research showing its role in enhancing decision analytics and managerial strategy (Kulkov et al., 2023; Schmitt, 2022). However, this study provides a more specific contribution by demonstrating how AI-assisted MCDM improves prioritization stability in CSR contexts. Unlike prior studies that focus on general decision support or operational domains, the results of this study show that integrating AI-assisted weighting mechanisms reduces ranking volatility under sensitivity testing. This indicates that the proposed model produces more consistent and robust prioritization outcomes across varying decision scenarios. Furthermore, this study extends prior work by applying AI-assisted MCDM specifically to CSR program prioritization, supported by simulation-based ranking results. Previous studies primarily applied AI and MCDM in domains such as supply chain or operational decision-making (Dey et al., 2023). In contrast, the findings here demonstrate that prioritization outcomes are not only structured but also stable under changing weight configurations, representing a methodological advancement in decision modeling for CSR contexts.

C. Implications

This study contributes to CSR and decision analytics literature by integrating AI and MCDM into a unified analytical framework. It extends CSR research from descriptive reporting to structured decision-making models. The study also demonstrates how analytical techniques can evaluate strategic CSR alternatives systematically. This provides a foundation for further theoretical development in data-driven CSR management.

From a managerial perspective, the proposed model presents a potential analytical tool for structuring CSR prioritization processes. While the model enables systematic evaluation of alternatives based on multiple criteria, its application in real organizational contexts requires

empirical validation. The framework may assist managers in exploring trade-offs between social impact, strategic alignment, and cost considerations, but its effectiveness depends on contextual adaptation and data quality. Therefore, the model should be interpreted as a decision-support prototype rather than a fully deployable system.

D. Limitations

The study was based on simulated data, which may not fully represent real-world CSR decision-making conditions. Although the simulation approach allowed controlled evaluation, it limited the ability to validate findings using empirical data. The predefined set of criteria may not capture all contextual factors influencing CSR decisions. Additionally, the model did not incorporate dynamic feedback mechanisms present in live organizational environments. Moreover, the use of rule-based AI assistance limits the model's ability to capture complex, non-linear relationships that may exist in real-world decision scenarios. This constraint may affect the generalizability of the findings beyond controlled simulation settings.

E. Future Research

Future research can incorporate real organizational data to evaluate the model's applicability in practical settings. Expansion of evaluation criteria to include ESG indicators or industry-specific factors may enhance relevance. Advanced AI techniques, such as adaptive learning models, could improve decision responsiveness in dynamic contexts. Researchers may also explore hybrid decision models to increase analytical flexibility in CSR prioritization. Additionally, future studies may investigate the integration of machine learning-based weighting mechanisms to enhance model adaptability and predictive capability. Comparative validation across different industries and organizational scales could further strengthen the robustness and applicability of the proposed framework

VI. CONCLUSION AND RECOMMENDATION

This study developed an AI-assisted multi-criteria decision model to prioritize strategic Corporate Social Responsibility (CSR) programs, using simulation-based CSR scenarios evaluated across social impact, strategic alignment, sustainability, stakeholder benefit, and cost efficiency. The results indicate that social impact and strategic alignment were the most prominent criteria, while cost efficiency contributed less to prioritization outcomes. The model demonstrated the ability to structure complex decision-making processes, systematically highlighting trade-offs among competing CSR objectives. These findings should be interpreted as preliminary, as they are derived from a controlled simulation environment rather than real organizational data.

Accordingly, the proposed model provides a structured and transparent analytical approach for CSR evaluation, but its practical applicability requires further empirical validation.

Based on the results, organizations are potentially able to explore structured decision-support frameworks such as the proposed AI-assisted MCDM model to guide CSR prioritization processes. However, the implementation of this model should be approached cautiously, as its effectiveness depends on data quality, contextual factors, and real-world validation. Managers may systematically evaluate alternative initiatives, adjust criteria weights according to strategic priorities, and identify programs with higher societal and organizational relevance. The model may serve as a preliminary analytical prototype for decision-support system development, rather than a fully operational solution. Additionally, policymakers may consider such frameworks as potential references for promoting more evidence-based CSR planning, while acknowledging the need for further validation in practical settings.

Disclosure of Limited AI Assistance

The authors disclose that artificial intelligence tools, including ChatGPT, were employed in a limited capacity solely for language editing and stylistic enhancement, including improvements in grammar, clarity, and textual coherence. All core research activities comprising conceptualization, study design, data collection, analytical evaluation, interpretation of findings, and development of conclusions were undertaken entirely by the authors without AI involvement. The authors bear full responsibility for the originality, validity, and scholarly integrity of the manuscript.

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