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A Multi-Criteria Car Evaluation Method with User-Relevant Comfort Measures

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Abstract

This study introduces a multi-criteria decision-making framework for evaluating sedan automobiles in the Saudi market. The framework incorporates comfort measures relevant to users, including air-conditioning (A/C) strength and cabin noise level. These parameters are crucial in the context of Saudi Arabia's climate and are often overlooked in conventional car assessment methods. The methodology employs the Analytic Hierarchy Process (AHP), Factor Rating Method, and one-way Analysis of Variance (ANOVA) to quantitatively evaluate vehicles based on their technical performance and user preferences. A survey of 431 respondents identified the most influential factors in car-purchasing decisions and established a preferred price range of 50,000 to 100,000 SAR. Experimental testing was conducted on six sedans, divided equally between small and mid-sized categories, using anemometers and sound-level meters to measure air conditioning (A/C) output and interior noise levels. Statistical analysis using Minitab indicated a significant relationship between A/C strength and car type. Differences in noise level were not statistically significant, which may be attributed to the limitations of the sample size. The results demonstrate that integrating climate-specific comfort factors with multi-criteria evaluation methods enhances the accuracy of vehicle comparisons, supporting more informed decision-making for consumers and manufacturers in hot-climate regions.

Keywords

Multi-Criteria Decision-Making (MCDM), Analytic Hierarchy Process (AHP), Automobile Evaluation, Comfort Measures, ANOVA Analysis

1. Introduction

The process of selecting a suitable automobile for your needs has become increasingly complex, with numerous options available in the market, particularly with the introduction of more affordable Chinese alternatives. This complexity is due to the expansion of vehicle options, varying performance specifications, and the diverse needs and tastes of consumers. In a market such as Saudi Arabia, car selection is influenced not only by price, safety, and fuel efficiency. It is also shaped by regional conditions, particularly the extreme climate. Despite this, many existing car evaluation frameworks fail to incorporate environmental and comfort-related metrics. These criteria are critical in hot-weather regions. (Actual Market Research, 2025).

The motivation for this research stems from a gap in the literature and industry practices: the lack of quantitative measures addressing thermal comfort and acoustic performance in vehicle evaluation. Colley et al., (2022) mentioned that Air-conditioning (A/C) performance and cabin noise insulation are essential for driver comfort and satisfaction, especially in Saudi Arabia, where high temperatures and dusty conditions are prevalent all year round (Ubuy, 2025). Current car comparison methods primarily emphasize performance and cost-related metrics, overlooking important region-specific comfort parameters (Car Comparison KSA, 2025).

Consumers in Saudi Arabia face challenges when comparing vehicles because data on comfort-related characteristics, such as air conditioning efficiency and noise levels, is limited. The lack of this information leads many consumers to stick with what they already know and refrain from trying new brands. Consequently, car purchase decisions are frequently based on subjective impressions or marketing claims rather than objective, data-driven analysis (IBIMA, 2022). This research addresses this problem by developing a multi-criteria decision-making (MCDM) framework that integrates traditional evaluation metrics—price, safety, fuel consumption, and technology—with two newly introduced comfort measures: air conditioning (A/C) strength and cabin noise level. By using the Analytic Hierarchy Process (AHP), the Factor Rating Method, and ANOVA, this study provides a structured, quantitative approach to car evaluation that reflects user priorities under Saudi climatic conditions.

1.1 Objectives

This research aims to develop a comprehensive, data-driven framework for evaluating sedans in the Saudi Arabian market by integrating traditional performance indicators with user-centered comfort measures in this harsh environment. The study identifies and prioritizes key factors influencing vehicle purchase decisions among Saudi consumers through a structured survey, emphasizing comfort parameters that are frequently neglected in existing evaluation systems. Two quantitative measures, air-conditioning (A/C) strength and cabin noise level, are introduced and objectively tested to address the specific climatic challenges in Saudi Arabia, where high temperatures and environmental conditions significantly impact driving comfort. The Analytic Hierarchy Process (AHP) and the Factor Rating Method are used to assign relative weights to each criterion, allowing for a systematic comparison among vehicle alternatives. Experimental testing with anemometers and sound-level meters is conducted on a representative sample of sedans to measure air conditioning (A/C) performance and noise insulation. One-way analysis of variance (ANOVA) is applied to assess the statistical significance of the results. This research advances automotive decision-making by incorporating region-specific comfort metrics into car evaluation frameworks, providing empirical validation of their importance, and proposing a replicable multi-criteria decision-making model suitable for other regions with extreme climate conditions.

2. Literature Review

Ali et al. (2020) developed the Full Consistency Fuzzy TOPSIS method to enhance the accuracy of multi-criteria decision-making (MCDM) in car selection. Their study assessed seven vehicle alternatives based on style, fuel efficiency, price, comfort, and performance. The approach combined the Full Consistency method for calculating criterion weights and the Fuzzy TOPSIS technique for ranking alternatives, proving more effective than traditional TOPSIS and AHP methods in generating consistent rankings.

Multi-criteria decision-making techniques, such as the Analytic Hierarchy Process (AHP) and the Analytic Network Process (ANP), are widely applied in automobile evaluation to balance qualitative and quantitative factors. Gupta et al. (2015) employed AHP and ANP to assess customer priorities in vehicle selection using criteria such as equipment, design, engine power, transmission type, price, and after-sales services. The geometric mean of importance weights derived from AHP demonstrated its efficiency in handling subjective consumer evaluations.

Yaqoub and Al-Mallahin (2017) explored determinants influencing Hyundai car purchase decisions in Iraq through a 31-item survey analyzed with SPSS. The findings indicated strong correlations between customer behavior and key influencing factors such as price and brand trust, confirming the significance of behavioral modeling in purchase prediction.

Sevilgen and Kilic (2012) employed computational fluid dynamics to investigate the three-dimensional temperature distribution in automobile cabins. Their simulation of actual cabin geometries, combined with a virtual manikin model, enabled assessment of thermal comfort. The results demonstrated that temperature stabilization is achieved within 30 minutes of operation. This finding highlights the significance of air conditioning performance in maintaining cabin comfort, which is particularly relevant in hot climates such as Saudi Arabia.

In Indonesia, Ulkhaq et al. (2018) combined AHP and TOPSIS to evaluate nine car-selection criteria, including exterior design, performance, safety, price, fuel efficiency, resale value, and dealer service. Expert opinions were used to weigh the criteria, with results showing that price held the highest importance (weight = 0.182). The study validated that integrating AHP with TOPSIS yields reliable decision-support results in vehicle ranking.

Shende (2014) examined automobile consumer behavior across market segments, concluding that in higher vehicle classes such as executive and premium cars, brand image serves as a dominant determinant of purchase choice, followed by safety and performance. Similarly, Gokhale et al. (2021) found that while most factors influence luxury car purchases, only style, price, and brand reputation significantly affect buying intentions, suggesting targeted marketing as a key strategy for luxury manufacturers.

Kukova et al. (2016) investigated how the importance of vehicle attributes varies throughout the customer journey. Their findings revealed that priorities shift across three stages—research, dealer interaction, and ownership—indicating that manufacturers should emphasize different product features at each stage to enhance satisfaction and long-term brand loyalty.

Finally, Parmar and Prajapati (2010) analyzed customer attitudes toward the TATA Indica car in South Gujarat using the Fishbein Attitude toward Object model. Surveying 150 consumers, they found an overall positive attitude score of 74.21%, though gaps persisted between customer expectations and actual performance attributes. This highlights the continuing importance of aligning perceived value with measurable vehicle quality.

Collectively, these studies demonstrate that multi-criteria decision-making (MCDM) methods, including the Analytic Hierarchy Process (AHP), Analytic Network Process (ANP), Technique for Order Preference by Similarity to Ideal Solution (TOPSIS), and their hybrid forms, are effective for structuring complex car selection problems. The literature consistently shows that customer satisfaction and comfort are influenced by performance, price, brand perception, and environmental and ergonomic factors such as thermal comfort and noise level. Despite this, few studies have directly addressed comfort-related criteria in hot-climate markets. This gap underscores the need for region-specific evaluation frameworks, as proposed in this research.

3. Methods

Factors influencing the customer's choice of car-buying decision, given that the individual is social by nature, are influenced and affected by the society in which he lives, and therefore, it can be said that there are many factors that affect the customer's behavior directly or indirectly, and then affect his purchasing decisions. Thus, the focus will be on a group of factors that the researchers believe are important in the process of making a purchase decision as followers.

1. **Budget/ Price:** It is one of the primary determinants of value in marketing since it is determined based on each customer's perceived benefit of the product, which expresses the feature of the product that allows it to satisfy the need and fulfill the desire. Similarly, the amount that must be paid in exchange for receiving this benefit establishes the relationship between the benefit and the price, which determines the value. The greater the perceived benefit from customers compared to the price, the greater the value of the product to the customer; on the other hand, the higher the price than the perceived benefit, the lower the value of the product to the customer, and thus the exchange possibilities decrease as the customer abandons or postpones the purchase.
   Alternatively, the customer searches for a product whose perceived benefit exceeds the price that must be paid for it, indicating that the price is the value that the customer pays to the seller of the commodity or service in exchange for obtaining it, implying that the price is the monetary consideration determined by the seller and that the customer is satisfied. They defined price as the amount required in exchange for acquiring a good or service, or the sum of the values traded by customers in exchange for the benefits of obtaining or using the good or service. Despite the availability of high-quality products and the need and desire to acquire them, the consumer's reaction to price varies; however, the customer will not make a purchase decision unless they have the purchasing power.

2. **Country of origin**: Many studies conducted across different cultures indicate that customers tend, in general, to form a stereotype about the quality, suitability, and attractiveness of products from certain countries and regions, as customers tend to evaluate products in a positive manner. When its origin or production is in a country that enjoys a positive mental image, the reason for this is that the country of origin provides information to customers about the quality of the product and other aspects. Therefore, it has a major impact on a product's perceived value. The impact is based on the values that consumers have typically associated with a country's reputation for quality, providing value to both domestic and foreign audiences.

3. **Customization**: It is one of the most crucial factors based on which the customer's desire to buy is determined, and thus the customer is brought to buy the car based on the unique specifications of its kind, such as a unique color that is sold only to one customer or a special car design for the customer, etc.

4. **Advertising Activities:** There is no denying the importance of advertising efforts and their role in establishing organizational success and attracting customers. Despite the availability of the necessary marketing capabilities in front of many organizations, only a few of them succeed in finding the optimal strategy that makes their brand become People talk, and this is due to their assent to the mass of consumers, moving their intentions to buy, and motivating them, as all organizations search for the most feasible ways and methods to get closer to customers, stimulate their intentions to buy, and gain their satisfaction, as all organizations search for the most feasible ways and methods to get closer to customers, arouse their intentions to buy, Organizations in the automobile industry are expected to establish unique marketing and advertising strategies that differ from standard ways in order to reach the greatest number of potential clients.

5. **Safety**: The electronic systems technologies of modern cars that come with computer systems, such as those available in aircraft, in what is considered a qualitative leap that establishes a new stage in the automotive industry, have seen many developments in the past years that are completely new in some respects. These developments have focused on providing more safety and security to its users. The use of seat belts and the driver's airbag, which later evolved into front and side airbags, head protection curtains from rear shocks, anti-roll bars, and placing the engine in the center of the car, are examples of where company competition is increasing in creating new ways for the safety of cars and large vehicles.

6. **Performance**: A performance car is one that has superior performance in at least one of the following areas: acceleration, top speed, handling, and braking. In the past years, there have been many developments in the field of cars, which are considered completely new changes in some respects, as many car companies are standing on a number of projects at the present time from which they discover new horizons, as for cars in the future, and this was evident through the competition between these organizations to improve the performance of their cars through the continuous development carried out by these organizations, whether in private or in general, through the engines or the cars.

7. **Reliability:** (How frequently does the car break down?) Throughout their useful life, automobiles will always require some form of maintenance. For example, an automobile requires occasional maintenance, but if it does so frequently, we call it unreliable.

8. **Fuel**: The cost of fuel has made it one of the most important factors that must be taken into account for new car buyers, especially with climate change and countries' war against climate change to try to prevent emissions of carbon dioxide that come out of fuel, and thus the interest in renewable energy and environmental preservation has appeared.

9. **Durability:** (How long will the car last?) This is the effective life span. Customers want vehicles that function well for an extended period.

10. **Serviceability**: (How simple is it to repair the car?)
    The customer's view of an automobile is directly influenced by how quickly and economically it can be repaired.
11. **Aesthetics**: (What does the vehicle look like?) This is the visual attractiveness, which is determined by aspects such as style, color, shape, and other sensory characteristics.
12. **Features**: (What does the automobile do?) Customers usually associate high quality with cars that have extra features, such as those that go above the competition's basic performance.
13. **Reputation**: (What is the reputation of the car or its dealer?) Customers frequently rely on the car's or dealer's reputation in terms of after-sales services such as the lack of availability of spare parts, etc. Car failures that are very apparent to the public or require car recalls have a direct impact on this reputation.
    Purchase choice When a customer makes a car purchase decision, he/she evaluates many criteria so, these criteria will measure these options considering the various types of cars provided to the customer Yaqoub & Al-Mallahin (2017). After adequate data that the client worked hard to gather became accessible, and the

customer discovered that he can make the decision to purchase the car at the required price, the customer can make the purchase decision as seen in Montgomery (2020).

4. Data Collection

Using a survey, data were collected to determine the most common factors that consumers care about and the types of cars used by the Saudi population. The survey yielded 431 responses. The findings showed that the sedan is the most common car type; therefore, the decision was made to focus on it in the experiments and apply the AHP method in car selection. Additionally, the survey determined the weights of each criterion and the selected price range, revealing that the price range of the vehicle to be studied is between 50,000 and 100,000 SAR.

Additionally, according to the survey, the features most concerning to the customers were found to be the AC strength and noise insulation, which are important to users. Thus, the method for calculating was created, designed, and experiments were conducted to measure it. For noise insulation, the test was conducted at two speeds. The first speed is 80 km/h, which is the average speed on all streets, and the second speed is 100 km/h. It was chosen to be the average speed for the study, which is 80 km/h. The noise insulation is at its worst between 72 dB and 70 dB, with an acceptable range of 66 dB to 64 dB, and the best level is between 64 dB and 60 dB. A scale from 1 to 5, with 5 being the best rate, 3 being medium, and 1 being the worst.

The survey was designed to collect data relevant to the study. The survey comprises fourteen questions, each of which was strategically put to assist us in acquiring a deeper understanding of the project. The survey was conducted, targeting consumers, and 431 responses were received. These are the survey questions and their corresponding results:

5. Results and Discussion

5.1 Numerical Results

- The first question asked the user to choose the price they're willing to pay for a car. The options were 50k, 50k-100k, 100k-200k, and more than 200k SAR. First, identify the budget. Knowing people's budgets can help us identify the lowest and highest budget limits. As it shows, the majority of the responses collected were 50k-100k SAR.
- The 2nd question is a measure of importance level ranging from 1 to 5 (5 = incredibly important and 1 = low importance). The question is how important the A/C is in your vehicle.
- 3rd question measures the importance level of noise isolation inside the car. Insulating your car helps decrease unwanted and loud external noises, offering a low-noise interior or, even better, a completely noiseless car cabin.
- The 4th question is a measure of importance level ranging from 1 to 5. It is about fuel consumption; knowing this will help choose the most suitable cars for the user.
- The 5th question is also a measure of importance, and it is about the importance of vehicle safety standards. For example, antilock brakes and electronic stability control are highly desirable on new cars.
- 6th question is also a measure of importance, and it is about how important high-tech features are (like auto-parking and lane control).
- In the 7th question, the user is asked to write down a criterion that they think should be concluded. An example of the suggested criteria is shown below.
- Question 8 asked the users what cylinder size they would prefer. The choices were 4, 6, and 8. If it's more, they can specify by typing in the size.
- 9th question is to know the percentage of car usage in travelling. This question is placed so that, based on it, we can know how much noise isolation is needed for a car.
- 10th question is to know the number of daily hours a user spends in a car.
- In the 11th question, we ask the user what car they have, and they can choose from the variety of automobiles provided. If the user's car is not on the list, they can select others and add it.
- Question 12 is asking the model year of the car (2010-2020).

5.2 Graphical Results

The survey has been published, and 431 responses were collected. From the responses collected, the most important factors were the A/C strength, safety, fuel consumption, noise level, and technical level, with average rating levels of 4.66, 4.5, 4.23, 4.19, and 3.95, respectively. The data show that indeed the A/C strength is an important criterion

that needs to be considered in the decision-making process regarding the purchase of a new automobile, as shown in Figure 1.

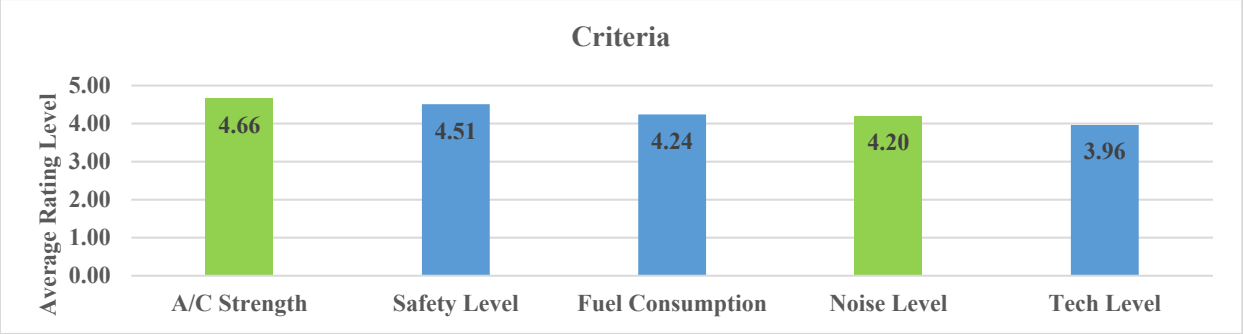

Figure 1. Criteria average rating levels

Figure 2. A/C responses

Based on the responses obtained from the survey, 344 responses, which is equal to 79.8% of our total responses, showed that the A/C Level is very important, as shown in Figure 2.

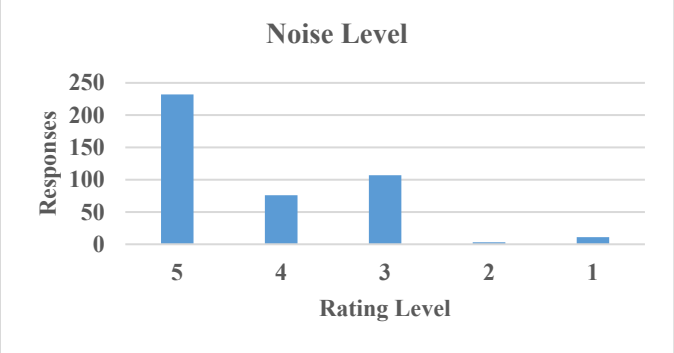

Figure 3. Noise Level responses

For noise level, it is located on the 4th, and most of the responses chose rating 5, as shown in Figure 3

5.3 Proposed Improvements

As seen form the survey incorporating these two measures are important for the consumer . thus, Collaboration with local automotive agencies and regulatory bodies such as SASO, could lead to the formal adoption of A/C and noise-level standards in car performance evaluation. This integration would ensure that comfort-related factors become a

recognized component of vehicle certification and consumer awareness in Saudi Arabia, along with measuring the total cost of ownership as a new metric to compare cars.

5.4 Validation

To obtain measurements related to the AC power and noise level, three instruments were used are UT363 Anemometer and UT353 Sound Level Meter. A simplified method based on measuring the speed of air in front of the air outlet was used to check for the amount of air supplied to car. The distribution ratio of air between distribution outlets is constant (all outlets were open). The anemometer will aid in gaining the numbers needed in determining air flow rate. Also, a mini sound meter which can convert ambient sound into electrical signals to constantly monitor ambient sound.

5.5 Experiment

By using the anemometer, the A/C strength experiment was conducted in three stages.
1. With all front seat A/C vents are open, the anemometer was placed 10 cm towards the vent and set at low level (speed).
2. Same as step 1 but, the A/C was set at medium level (speed).
3. The A/C was set at high level (speed).
As for the noise level experiment, the decibel meter was held at the driver's ear level and the numbers were taken at two speeds, 80 km/h and 100 km/h.

5.6 Applying the Analytic Hierarchy Process (AHP)

The parameters needed for the experiment in AHP and factor rating method are as follows in Figure 4:
Criteria: A/C strength, noise level, fuel consumption, safety and technology feature
Alternatives: cars

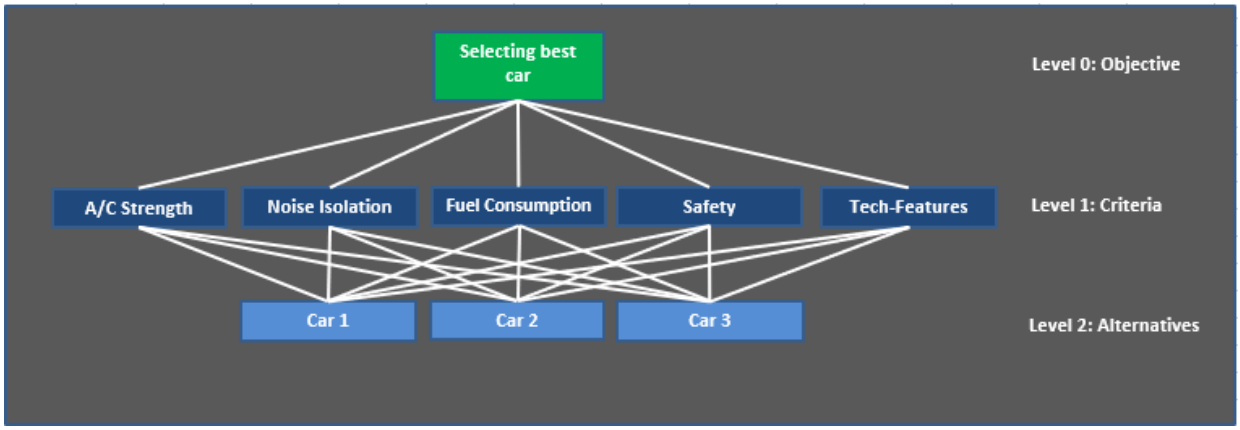

Figure 4. Step 1 of AHP

A hierarchical structure with the goal of selecting the best car has been made, the criteria at level 1 and alternatives at For ex: A/C is of strong importance than noise level (Figure 5- Figure 7).

Pair-wise comparsion matrix

Step 2 →

	A/C Importance	Noise	Fuel	Safety	Tech
A/C Importance	1.00	5.00	3.00	2.00	7.00
Noise	0.20	1.00	0.50	0.33	3.00
Fuel	0.33	2.00	1.00	0.50	6.00
Safety	0.50	3.00	2.00	1.00	7.00
Tech	0.14	0.33	0.17	0.14	1.00
Total	2.18	11.33	6.67	3.98	24.00

Figure 5.1 Step 2 of AHPStep 3, in this step the weight of each criterion by taking the average of the row.

Normalised Pair-wise comparsion matrix

Step 3 →

	A/C Importance	Noise	Fuel	Safety	Tech	Criteria Weight
A/C Importance	0.46	0.44	0.45	0.50	0.29	43%
Noise	0.09	0.09	0.08	0.08	0.13	9%
Fuel	0.15	0.18	0.15	0.13	0.25	17%
Safety	0.23	0.26	0.30	0.25	0.29	27%
Tech	0.07	0.03	0.03	0.04	0.04	4%

Figure 6. Step 3 of AHP

Step 3, the consistency is calculated to check if the values of the criteria weights are correct or not. The consistency ratio is 2.3%, since it's less than 10% this means that the matrix is reasonably consistent.

Calculating the consistency

Step 4

Criteria Weight	0.4291	0.0928	0.1711	0.2675	0.0395			
	A/C Importance	Noise	Fuel	Safety	Tech	Weighted sum value	Criteria Weight	
A/C Importance	0.4291	0.4640	0.5132	0.5351	0.2767	2.2180	0.4291	5.1694
Noise	0.0858	0.0928	0.0855	0.0892	0.1186	0.4719	0.0928	5.0856
Fuel	0.1430	0.1856	0.1711	0.1338	0.2372	0.8706	0.1711	5.0891
Safety	0.2145	0.2784	0.3422	0.2675	0.2767	1.3793	0.2675	5.1558
Tech	0.0613	0.0309	0.0285	0.0382	0.0395	0.1985	0.0395	5.0212

Lambda =	5.1042
Consistency Index	0.0261
Consistency Ratio	0.023259

Consistency Index (C.I) = Lambda - N / N -1

Consistency Ratio (C.R) = C.I / Random Index R.I

R.I is given from a table. The value depands on N (R.I = 1.12)

Since the C.R is less than 10%, we can assume that our matrix is reasonably consistent

Figure 7. Step 4 of AHP

to ensure the accuracy and reliability of the proposed multi-criteria evaluation framework, multiple validation approaches were applied at both the data collection and analytical levels. The survey data were first validated through consistency checks and response screening to confirm that only complete and relevant responses were included in the analysis. The Analytic Hierarchy Process (AHP) validation was performed using the Consistency Ratio (CR), which yielded a value of 2.3%, well below the 10% threshold, confirming that the pairwise comparisons were logically consistent and statistically sound.

Experimental validation involved replicating A/C and noise-level measurements across multiple trials under similar environmental conditions to minimize random error. The collected experimental data were analyzed using one-way ANOVA to verify whether variations among car types were statistically significant. The results indicated a significant effect of car type on A/C performance ($p = 0.001$), validating the robustness of the measurement procedure and the relevance of this comfort criterion.

After determining the weights of each criterion from the survey, six cars were tested to gather the A/C strength score and noise level. Based on the experiments carried out and the online reviews read, the ratings were inserted into the tables below, where the factor rating method was applied. The ratings were multiplied by the weights of the criteria to obtain a score; all scores were then added up to determine the final score of the car. The comparison was made in the two-car category, specifically between the small sedan and the medium-sized sedan, as shown in Tables 5 and 6 below. Three cars from each category were selected, and the car with the highest percentage of votes was declared the

winner. These results showed that, based on user preference, the best mid-sized sedan is the 2022 Mazda 6, and the best small-sized sedan is the 2021 Geely Binray.

*The data in the tables below are collected from the experiment, which includes noise level and A/C power. On the other hand, Fuel consumption, Safety, and technology. Safety ratings were collected from Euro NCAP (2022).
The experiment rating range is as follows:

- Ratings were given to each test subject based on the Tables (Table 1- Table 6) below:
  *For the safety criterion, the data is collected from a certified website for each car
  A/C strength based on the rating of each car

Table 1. A/C Strength translation from device to scale

A/C Strength	Rating
9.5	**5**
8	**4**
6.5	**3**
5	**2**
3.5	**1**

Table 2. Noise level based on rating

dB level	Rating
60	**5**
63	**4**
66	**3**
69	**2**
72	**1**

Table 3. fuel consumption based on the rating

Fuel Consumption km/liter	Rating
21-25	**5**
17-20	**4**
13-16	**3**
9-12	**2**
9 and smaller	**1**

The features of the car were evaluated as shown in the table below. The car is evaluated based on whether it has one or more features. Therefore, the more technology in the car, the more points the car gets. These features are conducted for each car, including both categories, in order to get the rating level. Each team member has given every feature a weight, and the average of these weights was then taken as the final weight for a feature.

Table 4. Calculating the average weight based on judges

Features	Judge 1 (Weights)	Judge 2 (Weights)	Judge 3 (Weights)	Average Weight
Sun roof	0.2	02	0.3	0.23
Adaptive Cruise Control.	0.8	1.0	1.2	1.00
Screen.	0.5	0.4	0.5	0.47
Air conditioning seats	0.7	0.4	0.4	0.50
Navigation	0.2	0.3	0.4	0.30
Start engine button.	0.6	0.2	0.5	0.43
Lane control	0	0.6	0.6	0.40
Rear view camera	1.0	0.5	0.4	0.63

CarPlay	0.5	0.7	0.5	0.57
Anti-collision warning	0.5	0.4	0.5	0.47

Table 1. Small sedan comparison3

		Small-Sized Sedans					
		Hyundai - Elantra 2021		Geely - Binray 2021		Changan - Eado 2021	
Criteria	Weights (%)	Ratings (Out of 5)	Score	Ratings (Out of 5)	Score	Ratings (Out of 5)	Score
Noise Level	0.09	2.00	0.18	4.00	0.36	3.00	0.27
AC Power	0.43	4.00	1.72	5.00	2.15	3.00	1.29
Fuel Consumption	0.17	3.00	0.51	4.00	0.68	3.00	0.51
Safety	0.27	4.00	1.08	4.50	1.22	5.00	1.35
Tech Level	0.04	2.80	0.11	3.80	0.15	5.00	0.20
Total	1		3.60		4.56		3.62
Percent (%)	100%		72%		91%		72%
	Price Range (50-100K)	70k		65k		65k	

Table 2. Med-sized sedan comparisons

		Med-Sized Sedans					
		Toyota -Camry 2022		Mazda 6 2022		Honda - Accord 2022	
Criteria	Weights (%)	Ratings (Out of 5)	Score	Ratings (Out of 5)	Score	Ratings (Out of 5)	Score
Noise Level	0.09	5.00	0.45	3.00	0.27	3.0	0.27
AC Power	0.43	4.00	1.72	5.00	2.15	3.4	1.29
Fuel Consumption	0.17	3.00	0.51	3.0	0.51	4.00	0.68
Safety	0.27	5.00	1.35	5.00	1.35	5	1.35
Tech Level	0.04	1.47	0.06	1.90	0.08	2.37	0.09
Total	1		4.09		4.36		3.68
Percent (%)	100%		81%		85%		76%
	Price Range (50-100K)	98k		91k		98k	

Furthermore, cross-validation between AHP-derived weights and survey-based consumer priorities confirmed that user preferences were accurately reflected in the model's weighting structure. This alignment between subjective perception and objective data supports the validity and applicability of the developed framework for evaluating cars in the real-world Saudi market.

6. Conclusion

To conclude, users require a quantitative method for selecting the most suitable cars for their specific needs. It is often difficult to make the right decision when purchasing a car due to the variety of cars on the market and the promotional offers that car dealers use to entice consumers into buying their product without fully understanding the consequences. The data selected for the study were based on the results of a survey in which respondents were asked about the most

significant automotive characteristics that customers desire. In KSA, for instance, several air conditioning (A/C) issues are reported, and individuals experience heat issues due to inadequate A/C strength. According to the comments of the persons surveyed, the importance of A/C strength in terms of safety, fuel usage, noise insulation, and technology level was evident. The next phase of the project involves establishing the measurement techniques that were developed, presenting them to SASO (2022), and assisting in displaying them to consumers based on the precise data received from car manufacturers regarding the vehicle's capabilities and specifications. This will help educate the consumer about the product's strengths and weaknesses, enabling them to choose the sedan vehicle in KSA that best meets their expectations of consumers on all levels.

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Biography

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