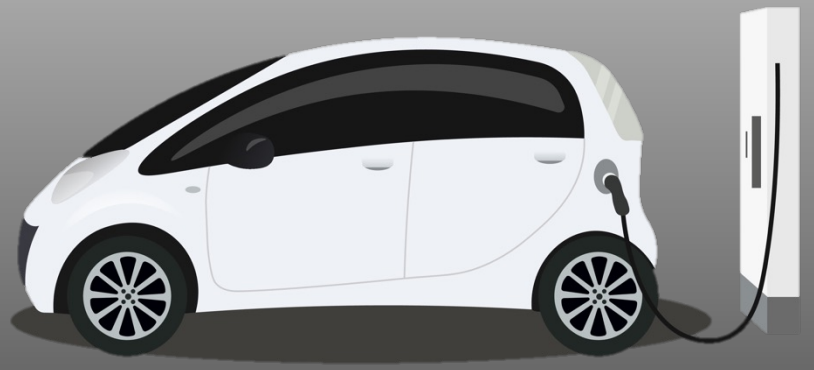
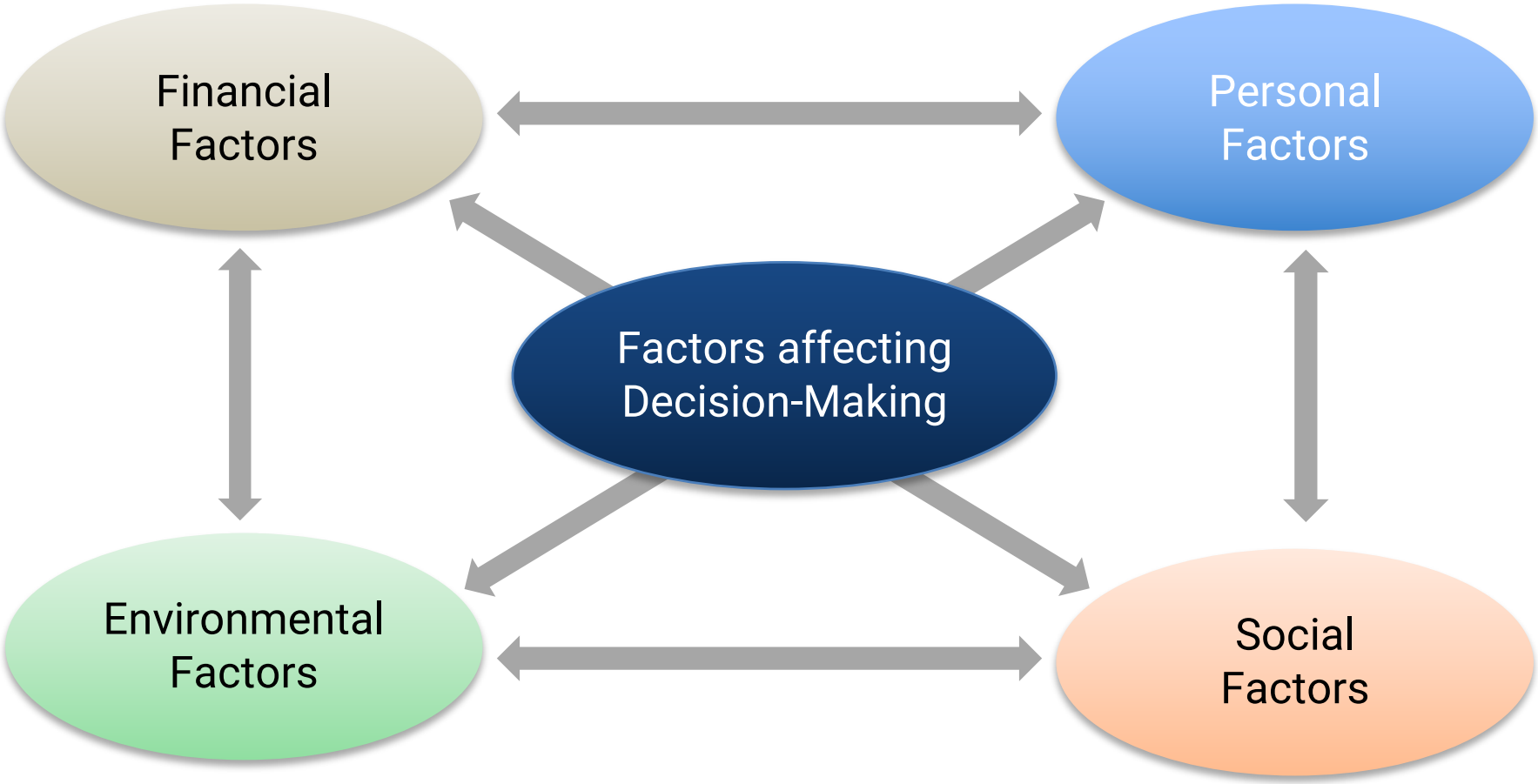
Multi-Attribute Analysis

Practical and Reliable…

Sporty and Eco-Friendly…



Multi-Attribute Analysis



When decision-making involves more than just money…

Buying A Car…What Matters to You?

Sporty EV

Price: $18,500 (after rebates)
Range: 300 miles

Important Attributes:
- ✓ Price
- ✓ Fuel Economy
- ✓ Styling

Practical Minivan

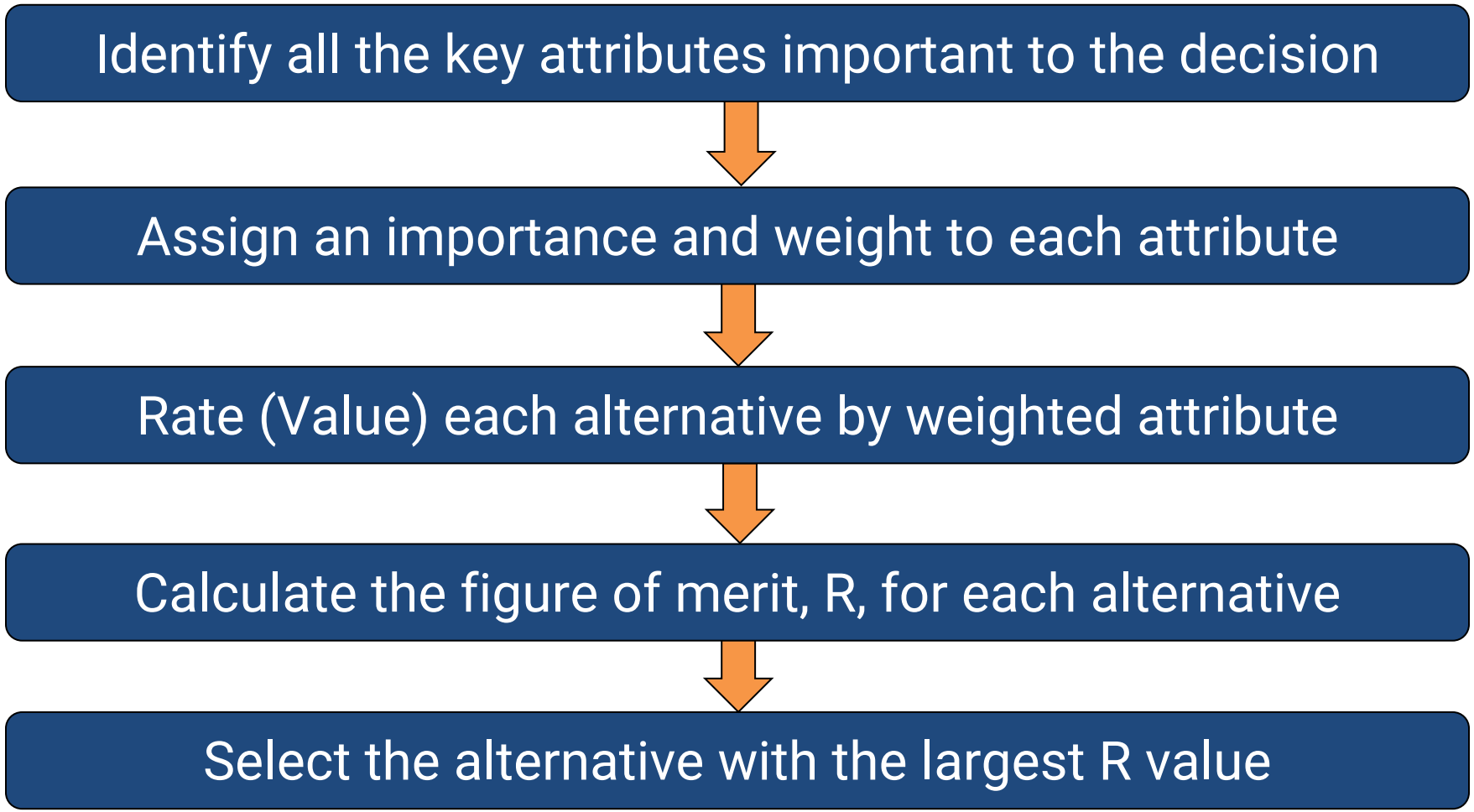
Price: $30,000
Fuel Economy: 25 miles per gallon

Important Attributes:
- ✓ Space for Everyone
- ✓ Safety
- ✓ Fuel Economy

How can we take all these attributes into account?

Multi-Attribute Analysis…

The Weighted Attribute Approach



The Weighted Attribute Approach

vs.

Step 1: Identify all the key attributes involved in the decision.

- ✓ Price
- ✓ Fuel Economy
- ✓ Styling
- ✓ Reliability
- ✓ Safety

More often than not, important attributes from a product perspective are defined by customers – Critical Customer Requirements (CCRs).

The Weighted Attribute Approach

vs.

Step 2: Assign an importance and weight to each attribute

- ✓ Rank order the attributes in terms of importance
- ✓ Assign a value of 100 to most important
- ✓ Assign an “importance value” to the remaining attributes
- ✓ Sum the Importance Values
- ✓ “Weight” each attribute by its Importance Value / Sum of Values

The Weighted Attribute Approach

vs.

Step 2: Assign an importance and weight to each attribute

Attribute, i	Importance Score, S_i	Weight, W_i
Price	100	100 / 300 = 0.33
Styling	90	90 / 300 = 0.30
Fuel Economy	70	70 / 300 = 0.23
Safety	30	30 / 300 = 0.10
Reliability	10	10 / 300 = 0.03
Sum	**300**	**1.00**

The Weighted Attribute Approach

vs.

Step 3: Rate each attribute for all alternatives.

Define a “rating” value for each attribute and apply it to both alternatives.

Likert Scale: defines a range of possible values, such as 1-10, where 10 is very strong rating, and 1 is very weak:

Example: Styling:

- A rating of 10 = very stylish – I feel uber cool in this car
- A rating of 1 = no style whatsoever – something only my parents would drive…

Another rating system is the 9-3-1 approach, which spreads out the results, making it even easier to identify the clear choice.

The Weighted Attribute Approach

vs.

Step 3: Rate each alternative by the weighted attribute

Attribute, i	Value, V(Sporty EV)	Value, V(Practical Minivan)
Price	9	7
Styling	10	4
Fuel Economy	10	5
Safety	5	9
Reliability	4	8

1 is weak; 10 is strong

The Weighted Attribute Approach

vs.

Step 4: Determine a figure of merit, R, for each alternative

Attribute i	Weight W_i	Value V_i (EV)	R_i (EV)	Value V_i (Minivan)	R_i (Minivan)
Price	0.33	9	2.97	7	2.31
Styling	0.30	10	3.00	4	1.20
Fuel Economy	0.23	10	2.30	5	1.15
Safety	0.10	5	0.50	9	0.90
Reliability	0.03	4	0.12	8	0.24

$R_i = W_i \times V_i$ $R_i = W_i \times V_i$

The Weighted Attribute Approach

vs.

Step 5: Sum the R_i's; select the alternative with the largest R

Attribute i	Weight W_i	Value V_i (EV)	R_i (EV)	Value V_i (Minivan)	R_i (Minivan)
Price	0.33	9	2.97	7	2.31
Styling	0.30	10	3.00	4	1.20
Fuel Economy	0.23	10	2.30	5	1.15
Safety	0.10	5	0.50	9	0.90
Reliability	0.03	4	0.12	8	0.24
		R_{total} (EV)	8.89	R_{total} (Minivan)	5.80

The Weighted Attribute Approach

vs.

Challenges with the Weighted Attribute Approach

If you don’t like your result, its too easy to re-evaluate your inputs (thereby rationalizing the result you want!).

What if there are more people involved in the ranking and valuation process? This takes consensus building to get to a final result everyone can agree to.

Main Takeaways…

The Multi-Attribute Analysis method is a very useful tool to take non-financial factors into account when making a decision.

The approach is a 5-step process:

1. Define the attributes of interest (the key decision criteria).
2. Assign each attribute an importance score and its weighting factor.
3. Rate each alternative one attribute at a time, giving it a rating of 1-10.
4. Multiply the attribute's weighting factor by its rating to obtain its figure of merit, R.
5. Sum up the R-values for each alternative.

The best alternative has the largest total R value; which accounts for the importance of each attribute and the alternative's rating relative to the attribute.

Next Time…

Decision Time: Which Job do you Select?

Credits & References

Slide 1: Minivan, isolated by algre, Adobe Stock (48343629.jpeg). Flat vector illustration of a white electric car suv charging at the white charger station by Мария Запеченко, Adobe Stock (419653028.jpeg). Puzzled confused woman has hesitant expression by Wayhome Studio, Adobe Stock (254158203.jpeg).

Slides 3, 5-12: Minivan, isolated by algre, Adobe Stock (48343629.jpeg). Flat vector illustration of a white electric car suv charging at the white charger station by Мария Запеченко, Adobe Stock (419653028.jpeg).

Slide 14: Life balance choices signpost, with sunrise sky backgrounds by SasinParaksa, Adobe Stock (142780777.jpeg).