**Vendor Selection**

Two vendors are under consideration for a project. The project planning committee generated the following judgments for the selection process. The selection will be made using two criteria, technical ability, and administrative efficiency where the technical ability is twice as important as the administrative efficiency. After examining all the technical ability information, vendor A is considered three times more important as vendor B. But the administrative efficiency information indicated vendor B is nine times more important than vendor A. Which vendor is chosen because of the highest weighed score?

**MCDM (Multiple Criteria Decision Model) Approach**

1. The relationship between criteria will be called weights. The relationships between vendors based on criteria information will be called measures. Express weights and measures as ratio scale values.

2. Record weights and measured, then obtain weighted scores.

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Weights** | **Vendor A** | **Vendor B** |
| **Technical** | 2 | 3 | 1 |
| **Administrative** | 1 | 1 | 9 |
| **Weighted Scores** |  | **7** | **11** |
|  |  | **7=2\*3+1\*1** | **11=2\*1+1\*9** |

3. Vendor B is preferred over Vendor A because of the weighted scores, 11>7.

4. However, the weighted scores are biased due to the magnitude of the measures.

5. To obtain unbiased weighted scores, follow the process.

6. Take the sum of the measures.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Weights** | **Vendor A** | **Vendor B** | **Sum** |
| **Technical** | 2 | 3 | 1 | 4 |
| **Administrative** | 1 | 1 | 9 | 10 |

7. Normalize measures by their sum to eliminate magnitude bias.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Weights** | **Vendor A** | **Vendor B** | **Sum** |
| **Technical** | 2 | 3/4 | 1/4 | 1 |
| **Administrative** | 1 | 1/10 | 9/10 | 1 |
| **Unbiased Weighted Scores** | | **1.6** | **1.4** |  |
|  |  | **1.6=2\*(3/4)+1\*(1/10)** | **1.4=2\*(1/4)+1\*(9/10)** |  |

8. Using unbiased weighted scores, Vendor A is preferred over Vendor B because of the unbiased weighted scores, 1.6>1.4.

9. Identical results can be obtained by using the modified criteria weights with the sum of the measures.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Modified**  **Weights** | **Vendor A** | **Vendor B** | **Sum** |
| **Technical** | 2/4 | 3 | 1 | 4 |
| **Administrative** | 1/10 | 1 | 9 | 10 |
| **Unbiased Weighted Scores** | | **1.6** | **1.4** |  |
|  |  | **1.6=(2/4)\*3+(1/10)\*1** | **1.4=(2/4)\*1+(1/10)\*9** |  |

10. For this approach, require all measures and weights to be:

“Ratio Scale” & “Positive (i.e., >0)” & “higher is better.”

11. This is a simple version of MCDM (Multiple Criteria Decision Model).

**Alternative Approaches**

**Scores**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  | Proposal #1 | Proposal #2 | Proposal #3 |  |
| Criteria | Weight | Scores | Scores | Scores |  |
| Technical approach | 30 | 72 | 74 | 73 |  |
| Management approach | 30 | 33 | 29 | 31 |  |
| Past performance | 20 | 52 | 58 | 60 |  |
| Price | 20 | 63000 | 47000 | 55000 |  |
| Weighted Score |  | 1264190 | 944250 | 1104320 | 🡨Biased |

**Ranks**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  | Proposal #1 | Proposal #2 | Proposal #3 |  |
| Criteria | Weight | Ranks | Ranks | Ranks |  |
| Technical approach | 30 | 3 | 1 | 2 |  |
| Management approach | 30 | 1 | 3 | 2 |  |
| Past performance | 20 | 3 | 2 | 1 |  |
| Price | 20 | 3 | 1 | 2 |  |
| Weighted Score |  | 240 | 180 | 180 | 🡨Biased |

**Points**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Possible | Proposal #1 | Proposal #2 | Proposal #3 |  |
| Criteria | Points | Points | Points | Points |  |
| Technical approach | 30 | 23 | 25 | 24 |  |
| Management approach | 30 | 22 | 19 | 21 |  |
| Past performance | 20 | 12 | 13 | 14 |  |
| Price | 20 | 11 | 15 | 13 |  |
| Weighted Score |  | 1810 | 1880 | 1890 | 🡨Biased |

**Unbiased Scores, Ranking, and Points**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | Proposal #1 | Proposal #2 | Proposal #3 | Sum of | Modified |
| Criteria | Weight | Scores | Scores | Scores | Scores | Weights |
| Technical approach | 30 | 72 | 74 | 73 | 219 | 30/219 |
| Management approach | 30 | 33 | 29 | 31 | 93 | 30/93 |
| Past performance | 20 | 52 | 58 | 60 | 170 | 20/170 |
| Price (Reciprocal) | 20 | 1/63000 | 1/47000 | 1/55000 | K | 20/K |
| Price | 20 | 63000 | 47000 | 55000 |  |  |
|  |  |  |  |  |  |  |
| **Unbiased Weighted Score** |  | **32.36** | **34.01** | **33.63** | 🡨Unbiased | |