

# Evaluation of Supplier on Vendor through Analytical Supplier Selection Process

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**Abstract:** All the manufacturing industries operate the manufacturing process in a different location. The different parts are manufactured from different Industries. The chain network differs for various industries. This operation is controlled by the Supply Chain Network. The various input and output parameters are provided. The output parameters are controlled by the analytic network process method (Ahp). The process parameters differ for various industries. The various input parameters are discussed below.

**Keywords:** supply chain management, customer relationship, vendor development

## 1. Introduction

The papers are discussed with the various engineering industry problem analysis by SCM method. The process improvement discussed with the various network techniques<sup>1</sup> the paper are discussed with the JIT method with SCM concept. The concept implementation by the way of improvement the customer satisfaction<sup>2</sup> the paper discussed with the various application in AHP method. The output result improvement by industry application. The decision making is improvement with SCM.<sup>3</sup> the paper discussed with TVP process. Total value production (TVP). The data analysis by SCM Method. The output value improved by SCM Method. The method implement by various industries<sup>4</sup>. the paper discussed with the Interactive Gravitite analysis. The IGA method is implemented by various industries. The result with discussed in a various application<sup>5</sup> described a case study into vendor rating for a government sponsored Entrepreneur Development programme in Malaysia. The paper is discussed about current trend of the vendor rating method. The method improvement in a industry. It will improved in 60% of the regular process<sup>6</sup>. the paper discussed with the AHP method for industry problems. Finally they have concluded with the problems and implement the industries. And finally the implement the data in a vendor development. It is improvement in a process levels<sup>7</sup> provided

a comparison of the two approaches and will attempt to look at how AHP can be modeled to take advantage of TCO methodology to make it more robust.<sup>8</sup> the process improvement by vendor selection method. The vendor selection based on AHP analysis. The analysis of AHP in a quality, delivery time, demand, and various factors. The output will be implement by various industries.<sup>9</sup>the paper discussed with the supplier selection management systems. The various factor consider the SSMS systems. The parameters implement the various industries. The process will be improved by the systems<sup>10</sup>

The input variables are discussed below

In this model twelve potential important variables are discussed below

1. Quality
2. Quantity
3. Delivery time
4. Demand
5. Cost
6. Discount
7. Sales after service
8. Communication system
9. Technical Capability
10. Production facilities
11. Geographical location
12. Professionalism of Sales Person

## 2. Evaluation of Important Criteria

The important criteria are selected based on the order of maximum value of relative impact as shown in Table 3.4.

|               | Quality | Quantity | Delivery Time | Demand | Cost | Discount | Sales After Service | Communication System | Technical Capability | Production Facilities | Geographical Location | Professionalism Of Sales Person |
|---------------|---------|----------|---------------|--------|------|----------|---------------------|----------------------|----------------------|-----------------------|-----------------------|---------------------------------|
| Quality       | 1       | 4        | 3             | 2      | 4    | 8        | 3                   | 3                    | 8                    | 9                     | 4                     | 4                               |
| Quantity      |         | 2        | 4             | 3      | 4    | 7        | 4                   | 8                    | 4                    | 10                    | 3                     | 8                               |
| Delivery Time |         |          | 3             | 2      | 2    | 5        | 4                   | 4                    | 8                    | 12                    | 5                     | 7                               |
| Demand        |         |          |               | 2      | 3    | 5        | 2                   | 2                    | 3                    | 5                     | 3                     | 8                               |
| Cost          |         |          |               |        | 2    | 6        | 5                   | 4                    | 3                    | 8                     | 5                     | 9                               |
| Discount      |         |          |               |        |      | 2        | 3                   | 5                    | 4                    | 6                     | 6                     | 2                               |
| Sales After   |         |          |               |        |      |          | 2                   | 3                    | 6                    | 8                     | 9                     | 9                               |

|                                 |  |  |  |  |  |  |  |   |   |   |   |   |
|---------------------------------|--|--|--|--|--|--|--|---|---|---|---|---|
| Service                         |  |  |  |  |  |  |  |   |   |   |   |   |
| Communication System            |  |  |  |  |  |  |  | 2 | 7 | 7 | 7 | 6 |
| Technical Capability            |  |  |  |  |  |  |  |   | 8 | 4 | 8 | 7 |
| Production Facilities           |  |  |  |  |  |  |  |   |   | 4 | 4 | 4 |
| Geographical Location           |  |  |  |  |  |  |  |   |   |   | 2 | 6 |
| Professionalism of Sales Person |  |  |  |  |  |  |  |   |   |   |   | 2 |

**Table 3.1 Assigned preference values for criteria**

|                       | Quality | Quantity | Delivery Time | Demand | Cost | Discount | Sales After Service | Communication System | Technical Capability | Production Facilities | Geographical Location | Professionalism Of Sales Person |
|-----------------------|---------|----------|---------------|--------|------|----------|---------------------|----------------------|----------------------|-----------------------|-----------------------|---------------------------------|
| Quality               | 1       | 3        | 5             | 3      | 5    | 7        | 2                   | 5                    | 7                    | 8                     | 5                     | 3                               |
| Quantity              | 1/3     | 1        | 3             | 4      | 5    | 6        | 9                   | 4                    | 3                    | 2                     | 2                     | 7                               |
| Delivery Time         | 1/5     | 1/3      | 1             | 2      | 3    | 4        | 5                   | 5                    | 7                    | 1                     | 4                     | 6                               |
| Demand                | 1/3     | 1/4      | 1/2           | 1      | 6    | 4        | 8                   | 1                    | 2                    | 4                     | 6                     | 9                               |
| Cost                  | 1/5     | 1/5      | 1/3           | 1/6    | 1    | 7        | 5                   | 3                    | 2                    | 6                     | 7                     | 9                               |
| Discount              | 1/7     | 1/6      | 1/4           | 1/4    | 1/7  | 1        | 4                   | 4                    | 6                    | 7                     | 8                     | 2                               |
| Sales After Service   | 1/2     | 1/9      | 1/5           | 1/8    | 1/5  | 1/4      | 1                   | 4                    | 5                    | 5                     | 7                     | 9                               |
| Communication System  | 1/5     | 1/4      | 1/5           | 1      | 1/3  | 1/4      | 1/4                 | 1                    | 3                    | 5                     | 6                     | 8                               |
| Technical Capability  | 1/7     | 1/3      | 1/7           | 1/2    | 1/2  | 1/6      | 1/5                 | 1/3                  | 1                    | 6                     | 7                     | 6                               |
| Production Facilities | 1/8     | 1/2      | 1             | 1/4    | 1/6  | 1/7      | 1/5                 | 1/5                  | 1/6                  | 1                     | 3                     | 5                               |
| Geographical          | 1/5     | 1/2      | 1/4           | 1/6    | 1/7  | 1/8      | 1/7                 | 1/6                  | 1/7                  | 1/3                   | 1                     | 7                               |

|                                 |     |     |     |     |     |     |     |     |     |     |     |   |
|---------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|---|
| Location                        |     |     |     |     |     |     |     |     |     |     |     |   |
| Professionalism of Sales Person | 1/3 | 1/7 | 1/6 | 1/9 | 1/9 | 1/2 | 1/9 | 1/8 | 1/6 | 1/5 | 1/7 | 1 |

**Table 3.2 Calculate Reciprocal Matrix for the Criteria**

|                                 | Quality | Quantity | Delivery Time | Demand | Cost | Discount | Sales After Service | Communication System | Technical Capability | Production Facilities | Geographical Location | Professionalism Of Sales Person |
|---------------------------------|---------|----------|---------------|--------|------|----------|---------------------|----------------------|----------------------|-----------------------|-----------------------|---------------------------------|
| Quality                         | 1       | 3        | 5             | 3      | 5    | 7        | 2                   | 5                    | 7                    | 8                     | 5                     | 3                               |
| Quantity                        | 1/3     | 1        | 3             | 4      | 5    | 6        | 9                   | 4                    | 3                    | 2                     | 2                     | 7                               |
| Delivery Time                   | 1/5     | 1/3      | 1             | 2      | 3    | 4        | 5                   | 5                    | 7                    | 1                     | 4                     | 6                               |
| Demand                          | 1/3     | 1/4      | 1/2           | 1      | 6    | 4        | 8                   | 1                    | 2                    | 4                     | 6                     | 9                               |
| Cost                            | 1/5     | 1/5      | 1/3           | 1/6    | 1    | 7        | 5                   | 3                    | 2                    | 6                     | 7                     | 9                               |
| Discount                        | 1/7     | 1/6      | 1/4           | 1/4    | 1/7  | 1        | 4                   | 4                    | 6                    | 7                     | 8                     | 2                               |
| Sales After Service             | 1/2     | 1/9      | 1/5           | 1/8    | 1/5  | 1/4      | 1                   | 4                    | 5                    | 5                     | 7                     | 9                               |
| Communication System            | 1/5     | 1/4      | 1/5           | 1      | 1/3  | 1/4      | 1/4                 | 1                    | 3                    | 5                     | 6                     | 8                               |
| Technical Capability            | 1/7     | 1/3      | 1/7           | 1/2    | 1/2  | 1/6      | 1/5                 | 1/3                  | 1                    | 6                     | 7                     | 6                               |
| Production Facilities           | 1/8     | 1/2      | 1             | 1/4    | 1/6  | 1/7      | 1/5                 | 1/5                  | 1/6                  | 1                     | 3                     | 5                               |
| Geographical Location           | 1/5     | 1/2      | 1/4           | 1/6    | 1/7  | 1/8      | 1/7                 | 1/6                  | 1/7                  | 1/3                   | 1                     | 7                               |
| Professionalism of Sales Person | 1/3     | 1/7      | 1/6           | 1/9    | 1/9  | 1/2      | 1/9                 | 1/8                  | 1/6                  | 1/5                   | 1/7                   | 1                               |
| Column Total                    | 3.70    | 6.78     | 12.0          | 12.5   | 21.5 | 30.43    | 34.903              | 27.825               | 36.48                | 45.53                 | 56.143                | 72                              |

**Table 3.3 Arrive column-wise total for reciprocal matrix**

|                                 | Quality | Quantity | Delivery Time | Demand | Cost  | Discount | Sales After Service | Communication System | Technical Capability | Production Facilities | Geographical Location | Professionalism Of Sales Person | RI    |
|---------------------------------|---------|----------|---------------|--------|-------|----------|---------------------|----------------------|----------------------|-----------------------|-----------------------|---------------------------------|-------|
| Quality                         | 1       | 3        | 5             | 3      | 5     | 7        | 2                   | 5                    | 7                    | 8                     | 5                     | 3                               | 0.213 |
| Quantity                        | 1/3     | 1        | 3             | 4      | 5     | 6        | 9                   | 4                    | 3                    | 2                     | 2                     | 7                               | 0.157 |
| Delivery Time                   | 1/5     | 1/3      | 1             | 2      | 3     | 4        | 5                   | 5                    | 7                    | 1                     | 4                     | 6                               | 0.109 |
| Demand                          | 1/3     | 1/4      | 1/2           | 1      | 6     | 4        | 8                   | 1                    | 2                    | 4                     | 6                     | 9                               | 0.108 |
| Cost                            | 1/5     | 1/5      | 1/3           | 1/6    | 1     | 7        | 5                   | 3                    | 2                    | 6                     | 7                     | 9                               | 0.09  |
| Discount                        | 1/7     | 1/6      | 1/4           | 1/4    | 1/7   | 1        | 4                   | 4                    | 6                    | 7                     | 8                     | 2                               | 0.074 |
| Sales After Service             | 1/2     | 1/9      | 1/5           | 1/8    | 1/5   | 1/4      | 1                   | 4                    | 5                    | 5                     | 7                     | 9                               | 0.072 |
| Communication System            | 1/5     | 1/4      | 1/5           | 1      | 1/3   | 1/4      | 1/4                 | 1                    | 3                    | 5                     | 6                     | 8                               | 0.055 |
| Technical Capability            | 1/7     | 1/3      | 1/7           | 1/2    | 1/2   | 1/6      | 1/5                 | 1/3                  | 1                    | 6                     | 7                     | 6                               | 0.046 |
| Production Facilities           | 1/8     | 1/2      | 1             | 1/4    | 1/6   | 1/7      | 1/5                 | 1/5                  | 1/6                  | 1                     | 3                     | 5                               | 0.033 |
| Geographical Location           | 1/5     | 1/2      | 1/4           | 1/6    | 1/7   | 1/8      | 1/7                 | 1/6                  | 1/7                  | 1/3                   | 1                     | 7                               | 0.026 |
| Professionalism of Sales Person | 1/3     | 1/7      | 1/6           | 1/9    | 1/9   | 1/2      | 1/9                 | 1/8                  | 1/6                  | 1/5                   | 1/7                   | 1                               | 0.017 |
| Column Total                    | 3.7     | 6.78     | 12.0          | 12.5   | 21.59 | 30.4     | 34.90               | 27.825               | 36.48                | 45.53                 | 56.143                | 72                              | 0.02  |

**Table 3.4 Calculate degree of relative impact (RI) for evaluation criteria**

### 3. Result of ANP

The result of ANP is based on the values of relative impact of the criteria. The important criteria obtained as the results of ANP (Table 3.5).

| Sl.No. | Criteria      | RI    |
|--------|---------------|-------|
| 1      | Quality       | 0.213 |
| 2      | Quantity      | 0.157 |
| 3      | Delivery Time | 0.109 |
| 4      | Demand        | 0.108 |
| 5      | Cost          | 0.09  |

**Table 3.5 Result of ANP**

### 4. Conclusion

In this chapter, a detailed discussion has been made an ANP, factors influencing supplier selection, ANP based supplier selection process, identification of necessary criteria. The important criteria obtained as the result of ANP (relative impact) are quality, quantity, delivery time, demand and cost.

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