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DEPARTMENT OF AEROSPACE ENGINEERING
19MEE304 Total Quality Management

Topic: Supplier selection, Supplier Rating.

Introduction to Supplier Selection

- **Definition:** Supplier selection is the process of evaluating and choosing suppliers based on their ability to meet quality, cost, delivery, and service requirements.
- **Importance:**
  - ☑ Ensures high-quality raw materials/components.
  - ☑ Reduces supply chain risks and disruptions.
  - ☑ Enhances cost-effectiveness and operational efficiency.
  - ☑ Strengthens long-term partnerships for innovation and growth.

Supplier Selection Process

◈ **Step 1: Identify Business Needs**

- Define technical specifications, quality standards, and budget constraints.

◈ **Step 2: Supplier Search and Shortlisting**

- Use **Request for Quotation (RFQ)** and **Request for Proposal (RFP)** to gather information.
- Conduct **market research** to identify potential suppliers.

◈ **Step 3: Supplier Evaluation**

- Assess financial stability, manufacturing capabilities, and certifications (ISO 9001, AS9100 for aerospace, etc.).
- Perform **site visits and audits** for process validation.

◈ **Step 4: Negotiation and Contracting**

- Define price, lead times, warranty, penalties, and performance benchmarks.

◈ **Step 5: Supplier Performance Monitoring**

- Implement Key Performance Indicators (KPIs) for ongoing assessment.
- Continuous improvement and supplier development programs.

Key Supplier Selection Criteria

Criteria	Description	Example
Quality Standards	Compliance with ISO 9001, Six Sigma, etc.	Boeing requires AS9100 certification for aerospace suppliers.
Cost Competitiveness	Total cost of ownership (TCO), including logistics.	Automotive industry balances cost with quality for parts procurement.
Delivery Reliability	On-time delivery and lead time flexibility.	Just-in-Time (JIT) suppliers in Toyota's supply chain.
Technological Capabilities	Innovation and R&D expertise.	Apple partners with TSMC for advanced chip manufacturing.
Financial Stability	Strong financial health to avoid supply disruptions.	Boeing evaluates supplier liquidity before long-term contracts.
Sustainability Practices	Eco-friendly production and CSR compliance.	Tesla selects suppliers with green energy practices.
Communication & Support	Responsiveness to technical and service requests.	Dell evaluates suppliers on after-sales technical support.

Supplier Rating Systems

- **Definition:** Supplier rating is the process of measuring supplier performance using a scoring system.
- **Purpose:**
  - ☑ Identifies top-performing suppliers for long-term partnerships.
  - ☑ Highlights areas for supplier improvement.
  - ☑ Reduces risks in procurement decisions.

Supplier Rating Methods

Categorical Method (Simple Rating System)

- Evaluates suppliers based on subjective judgment (Excellent, Good, Average, Poor).
- **Example:**
  - Quality = **Good**
  - Delivery = **Excellent**
  - Cost = **Average**

◈ **Pros:** Easy to implement, quick decision-making.
◈ **Cons:** Subjective, lacks numerical precision.

Weighted Point Method (Quantitative Approach)

- Assigns numerical weights to different criteria based on importance.
- **Formula:**

$$\text{Total Score} = \sum (\text{Criteria Weight} \times \text{Supplier Score})$$

Example: Weighted Supplier Rating System

Criteria	Weight (%)	Supplier A Score	Supplier B Score
Quality	40%	9	7
Cost	30%	7	8
Delivery	20%	8	9
Support	10%	7	8
Total Score	**100%**	**7.9**	**7.8**

◈ **Pros:** Objective, easy to compare multiple suppliers.

◈ **Cons:** Requires accurate weight assignment.

Cost Ratio Method

- Evaluates the cost impact of supplier defects and delays.

- Formula:

$$\text{Cost Ratio} = \frac{\text{Total Supplier Cost}}{\text{Total Purchases}} \times 100$$

- **Example:** If defective parts cost $10,000 and total purchases are $200,000:

$$\text{Cost Ratio} = \frac{10,000}{200,000} \times 100 = 5\%$$

(Lower % means a more reliable supplier.)

◈ **Pros:** Focuses on cost-related efficiency.

◈ **Cons:** Ignores qualitative factors like innovation.

Analytical Hierarchy Process (AHP) (Advanced Method)

- Uses **pairwise comparisons** to evaluate suppliers based on multiple factors.
- Involves **decision matrices** and expert judgment.

◈ **Pros:** Highly structured, removes bias.

◈ **Cons:** Complex, requires specialized software (MATLAB, Excel Solver).

Industry Examples of Supplier Selection & Rating

📌 Case Study 1: Tesla's Supplier Selection for EV Batteries

- **Challenge:** Required high-performance lithium-ion batteries for electric vehicles.
- **Solution:** Partnered with Panasonic after rigorous selection based on:
  - ✔ Battery efficiency & energy density.
  - ✔ Cost reduction potential.
  - ✔ Sustainability initiatives.
- **Outcome:** Panasonic became Tesla's **exclusive supplier** for Gigafactory production.

📌 Case Study 2: Boeing's Supplier Rating in Aerospace

- Uses a **Gold, Silver, and Bronze** rating system for suppliers.
- Suppliers must meet stringent **quality, cost, and delivery KPIs**.
- **Result:** Enhanced **supplier accountability and defect reduction** in aircraft components.

Challenges in Supplier Selection & Rating

🚧 **Data Inaccuracy:** Inconsistent supplier performance data.

🚧 **Changing Market Conditions:** Raw material price fluctuations.

🚧 **Supplier Reliability Issues:** Unpredictable lead times and quality issues.

🚧 **Lack of Transparency:** Hidden costs and unethical sourcing.

◈ **Solution:** Implement **Supplier Relationship Management (SRM) software** like SAP Ariba, Oracle SCM.

Conclusion

- **Effective supplier selection ensures high quality, cost savings, and supply chain stability.**
- **Supplier rating helps identify top performers and drive continuous improvement.**
- **Companies like Tesla, Boeing, and Apple use data-driven methods to enhance supplier management.**