

# 18. Managing suppliers in engineering

**Operations and business development**  
Managing engineering operations

Every enterprise relies on suppliers. Informed decisions about what to buy and from whom, made against clear criteria as part of a strategic approach to supplier selection and management, help minimise risks and maximise the benefits. This allows an enterprise to use suppliers to maximise its competitive advantage, quality, and profitability.

# The decision to buy

Every enterprise buys in goods and services. These will include non-engineering items such as stationery or cleaning services. They will also include important parts or components. Buying in lets an enterprise focus on its specialism – how it creates unique customer value.

## Example

A robot manufacturer makes autonomous delivery robots.

- It makes obvious sense to buy in fasteners like screws and bolts.
- The efficient motors that drive the robots are specialist items. It makes sense to buy these. They are a critical component, but they are not what makes the robots unique.
- The software and hardware that power the robot are made in-house as these are what give the company its competitive advantage.

Every purchase decision lies on a spectrum of choices between two points.

### Make everything

A supercar manufacturer may make all components in its factory.



### Make nothing

A tech company may focus on research and product design but contract with manufacturing partners to make its product.

**Cost, quality, and delivery are key factors when buying in any product or service and the decision to buy requires the right balance of each of three factors.**

Quality

Cost

Delivery

### Forms of delivery

**To order:** Materials or components are ordered when needed.

**For inventory:** Materials or components are ordered to maintain minimum stock levels.

**Just in time:** Materials or components are ordered to arrive in the right quantity, at the right time, to be used immediately in manufacturing.

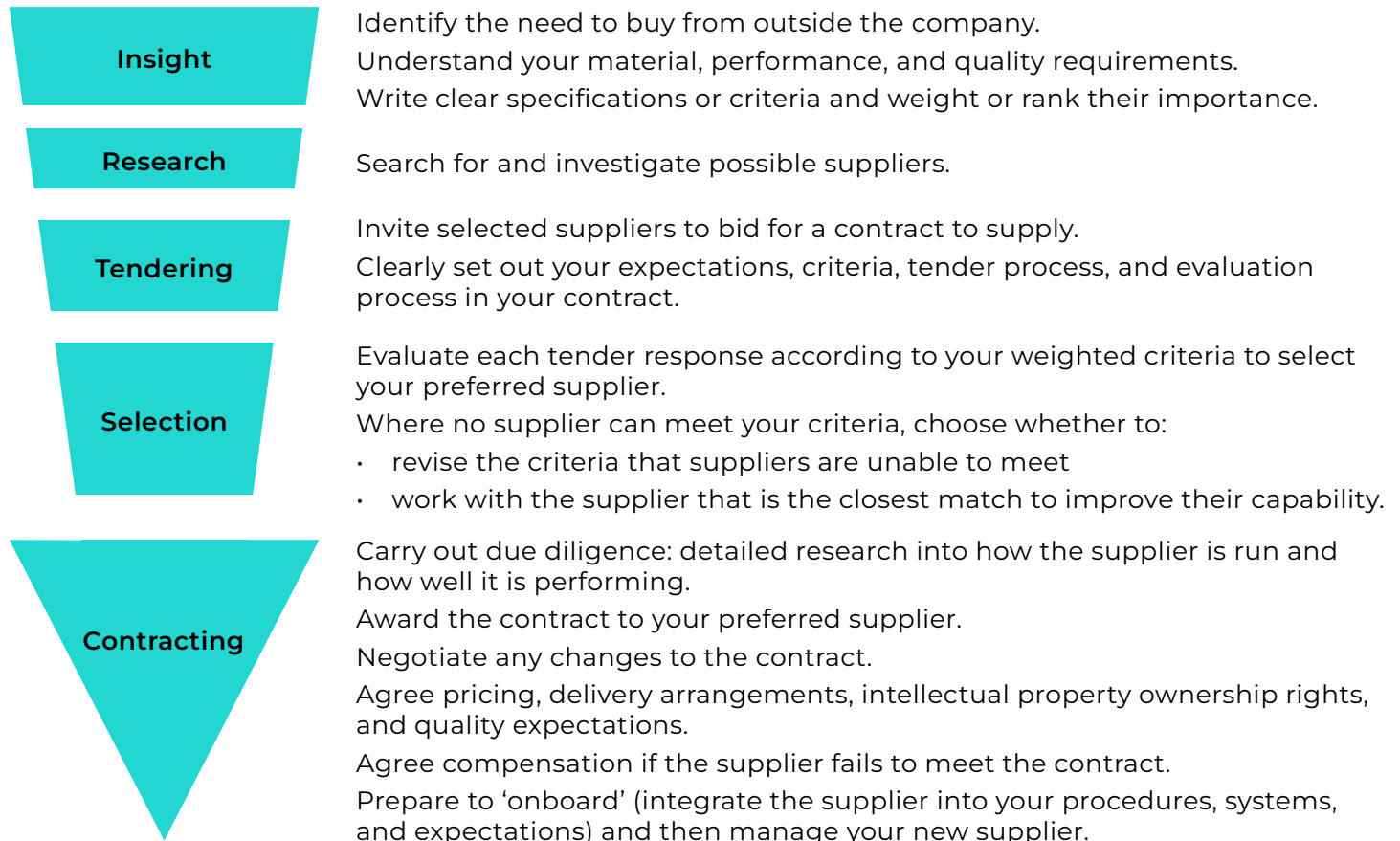
## Check your understanding:

1. List three non-engineering goods and three non-engineering services an enterprise might choose to buy in or outsource, and one risk (not cost) associated with each.
2. Identify one risk of making everything in-house, and one of outsourcing manufacturing, and how to minimise these risks.
3. Holding stock ties up money but can be helpful. Suggest why a manufacturer might choose each form of delivery above.

# Procurement: selecting suppliers

The right suppliers provide the best combination of cost, delivery, and quality, while minimising risk. **Procurement** is the process of finding, buying, and paying for the right goods and services, from the best possible supplier.

Procurement is a step-by-step process that starts with identifying that it is better to purchase than to make.



Agreeing a contract with a new supplier is only the start of your supplier management process and relationship.

## Check your understanding:

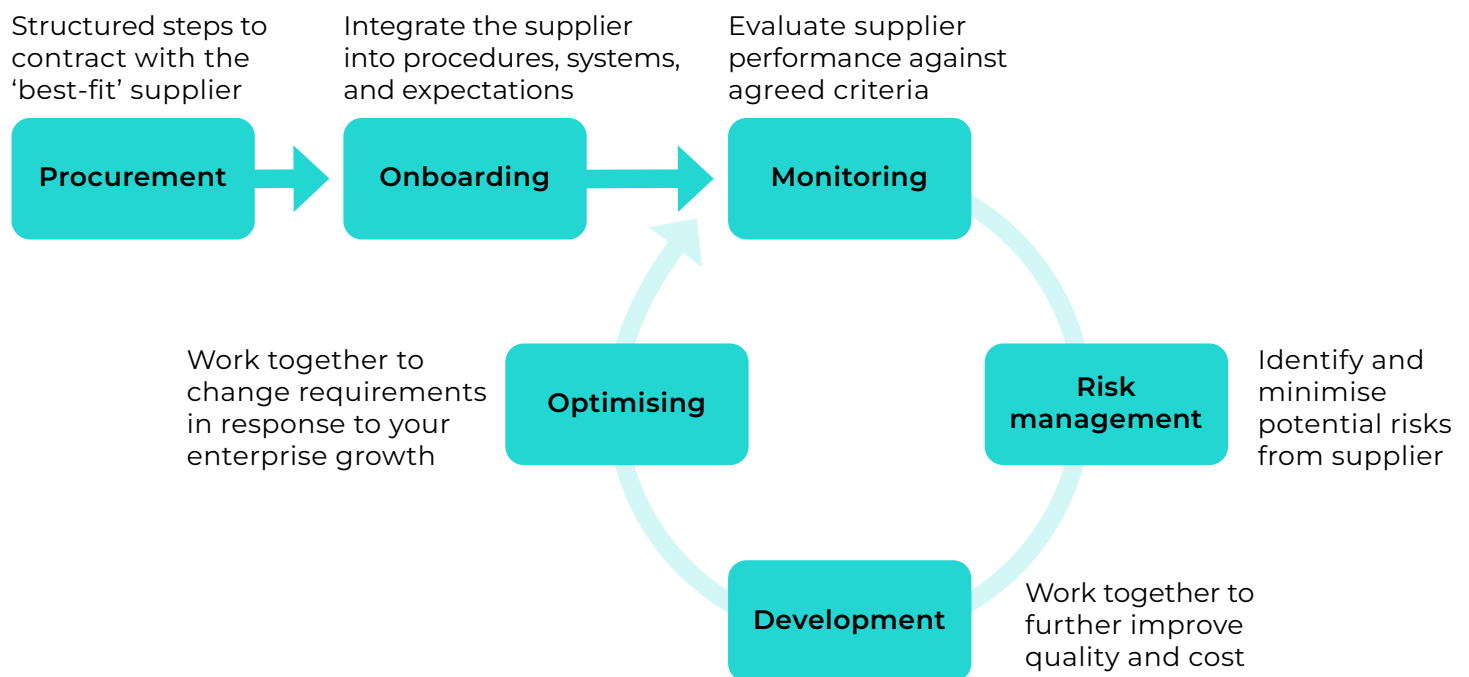
4. List and prioritise the criteria you might use (excluding cost) to select suppliers for:
  - CNC workshop cleaning
  - metal alloys for aerospace parts
  - rubber O rings for enclosure waterproofing.
5. The contracting phase starts with due diligence. Give three reasons why this is an essential step for critical suppliers.

# Managing suppliers

Like employees, getting the best from your suppliers is an ongoing process of setting clear expectations and goals, communicating well, and building a strong, positive relationship.

**Supplier lifecycle or relationship management** describes a cycle of steps that build strong supplier relationships, so your suppliers:

- perform at their best, for high quality and low errors
- adapt to your changing requirements as your products evolve in response to changing customer needs.



Effective supplier management, like negotiation, delivers 'win-win' outcomes for both parties:

Benefits for your enterprise	Benefits for your supplier
<ul style="list-style-type: none"> <li>• consistent quality</li> <li>• reduced risk</li> <li>• continuous improvement</li> <li>• control over costs</li> <li>• input into innovation</li> </ul>	<ul style="list-style-type: none"> <li>• predictable sales</li> <li>• reliable contribution towards overhead costs</li> <li>• input into innovation and improvement</li> <li>• develops reputation</li> </ul>

## Check your understanding:

6. List five possible supplier risks and one way to mitigate (reduce) each one.



# Case study: Balancing priorities

## Background

You are launching a startup engineering manufacturer that will produce widgets. You will make these to order and right now have minimal space and funding to store inventory of materials, work in progress or finished product.

You wish to explore how to optimise your purchasing decisions to meet three possible customer priorities: acceptable quality, minimum cost, or fastest possible delivery time of parts and materials to your factory.

## Your task

Use the **Managing suppliers online interactive tool** to explore your options and identify the best purchasing decisions to best meet each customer priority.

Click on the **i** icons to read more about each material or component, and about each criterion.

Note that components have the option to be made in-house.

1. Select a customer priority and then identify the suppliers that best satisfy that expectation. Note how prioritising one criterion affects the two others.
2. When you have finished investigating how best to meet each criterion alone, select and justify how you might best balance quality, cost, and delivery time.



## Extend your learning

Quality management is an essential part of an effective supply chain.

- Research the meaning of a quality management system.
- Write a brief email or note explaining the difference between a quality management system and product or service standards, and give three reasons why a startup should create and implement a quality management system from its first day of operations.

# Answers: Check your understanding

These are example answers – your own suggestions may differ.

## The decision to buy

1. Non-engineering good	Risk to manage
energy – electricity	supply capacity if scaling up
product packaging	print quality and product protection during transport
factory PPE	quality and standard of protection

Non-engineering service	Risk to manage
factory cleaning	standard of cleaning, respect for machines and materials
transport	delivery reliability
payroll services	reliability so employees are paid on time

Note that the example risks above all relate to aspects of quality or delivery.

2. One risk of making everything in-house is that if key staff leave or are ill, this will disrupt manufacturing. Training others to do each role can solve this.

A risk of outsourcing all manufacturing is that designs or patented technology might be copied. An exclusive manufacturing contract, with strict clauses about keeping trade secrets, can solve this.

3. To order: helpful for companies that only manufacture in response to customer orders and not in high volume.

For inventory: helpful for companies that always need stock to rapidly respond to demand, or when supply can fluctuate.

Just in time: helpful for high-volume, predictable manufacturing that can be precisely organised.

## Procurement: selecting suppliers

4. Example criteria when selecting suppliers (in priority order):

CNC workshop cleaning	Metal alloys for aerospace parts	Rubber O rings for enclosure waterproofing
quality of cleaning	specification and properties	specification and properties
reliability	testing	testing
environmental impact of products used	quality control	quality control
equipment, tools and materials are not adjusted or moved		

Note that again, the example criteria above relate to aspects of quality or delivery. This is why many criteria are similar.

## Answers: Check your understanding

5. Due diligence is essential for critical suppliers to ensure that the supplier:

- can deliver the right quality and quantity
- is financially stable and unlikely to go out of business
- adheres to industry standards, best practices, and relevant legislation.

These issues are continually monitored as part of effective supplier management.

### Managing suppliers

6.

Risk	Mitigation
Quality: the supplier fails to deliver goods of the required quality.	Specify quality when putting out to tender. Rigorous quality inspection upon delivery.
Delivery: the goods do not arrive on time or in the right quantity.	Plan 'slack' in the delivery schedule. Hold inventory sufficient to cover a delay in delivery.
Contractual: the supplied goods do not meet legal requirements, eg for hazardous chemicals.	Specify legal requirements when putting out to tender. Rigorous inspection of certifications upon delivery.
Financial: the supplier's in-costs (eg their own material costs) significantly rise.	Include clauses that anticipate supplier cost increases.
Strategic: the supplier becomes at risk of bankruptcy.	Review supplier's financial health when first awarding a contract and at regular (eg yearly) review intervals.

## Answers: Case study

These are example answers – your own suggestions may differ.

### 1. Prioritising maximum quality:

<b>Titanium</b>	B	Quality: 5.0/5 Cost: £45 Delivery: 14 days  The company could also choose supplier C for titanium, but this would increase the cost for no quality advantage.
<b>ABS</b>	F	
<b>Spring</b>	I	
<b>Diaphragm</b>	L	
<b>Bolt</b>	O	

### Prioritising minimum cost:

<b>Titanium</b>	A	Quality: 2.3/5 Cost: £21 Delivery: 16 days  These choices meet the minimum quality needed and more than halve the cost. But you may find that this quality level affects the durability or reliability of the product.
<b>ABS</b>	D	
<b>Spring</b>	G	
<b>Diaphragm</b>	J	
<b>Bolt</b>	M	

### Prioritising minimum delivery time to the factory:

<b>Titanium</b>	C	Quality: 3.3/5 Cost: £33 Delivery: 12 days  Since delivery depends on which item takes longest to deliver, there is no advantage to choosing more expensive options for the spring, diaphragm, or bolt if they take less time than the longest delivery time, because this increases expense at perhaps no advantage. But you could alter your production process to manufacture these parts while waiting for materials with longer delivery times.
<b>ABS</b>	E	
<b>Spring</b>	G	
<b>Diaphragm</b>	J	
<b>Bolt</b>	M	



## Answers: Case study

2. There is no model answer for this question. Use the 'Explore the interactive' section below to work through other examples of balancing the three customer priorities to test the assumptions you made.

### Explore the interactive

In reality, many customers do not prioritise one criterion at the expense of the others. Instead, they look for the best balance of quality, cost, and delivery time to suit their needs.

Use the interactive tool explore the best buy or make options for these scenarios. There is not necessarily a single best answer, so be ready to justify your supplier choices.

- Over time the choice to make components may become less expensive as you improve your production processes. What advantages might this provide?
- A customer wishes for a higher overall quality of 4.0 for the widgets they order, as these will be used in a more demanding environment.
- A customer asks for delivery within two weeks (16 days). The widgets will take four days to manufacture and ship to the customer once all the parts are in.
- A customer seeks a compromise between low cost and fast delivery.
- Your initial decisions were based on customer research prior to launch. Customer feedback suggests that maximising the quality of the spring and diaphragm is important for durability and lasting accuracy. What options satisfy this feedback?