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Pricing and decision models

Cost-plus, competition-based and value-based pricing, margin vs markup, contribution margin, break-even and spreadsheet decision models

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Online interactive version: **https://ozgurkonakci.com/en/guide/pricing-decision-models/**

SHORT ANSWER

In logistics, a quotation price is usually built by adding profit to cost, but the market price and the value the customer places on the service also come into it. When measuring profitability, do not confuse margin (profit as a share of the selling price) with markup (profit as a share of cost): a 20% markup is only about a 16.67% margin. The break-even point tells you when a lane or product starts to make money: monthly fixed cost ÷ contribution margin per shipment. For more complex decisions, sensitivity tables, Solver and simulation in Excel can help.

How is a price built? Three approaches

As marketing textbooks put it, price is the only element of the marketing mix that brings in revenue directly; everything done on the product, promotion and distribution side is a cost. A quotation price therefore has to win the customer and keep the business profitable. Marketing textbooks usually describe price setting through three approaches:

Approach	What sets the price	In logistics	Watch out for
Cost-plus	Your own cost plus a profit added on top	Buy rate + surcharges + local charges + markup	Customers do not see your costs; the price can end up above the market or needlessly below it
Competition-based	Competitors' and market prices	Spot rate levels, freight indices, competing bids in tenders	Anchoring on a competitor's price can make you forget your own cost structure
Value-based	The value the customer places on the service	Transit time, schedule reliability, visibility and tracking, a single point of contact, how fast problems get solved	Value is only what the customer perceives; value you do not communicate does not reach the price

In practice the three work together. Cost sets the floor you should not go below. The market sets the reference the customer will compare you with. The value of your service determines how far above that reference you can go.

Tracking the market: Spot ocean freight rates change frequently. Weekly indices such as Drewry's World Container Index track the spot level for a 40-foot container on major lanes in USD and are used as a reference for index-linked pricing in some contracts. An index does not give you your own buy rate; it shows which way the market is moving.

Margin and markup: same amount, different base

This is the most common calculation mistake when preparing quotes. The profit amount is the same, but the percentage changes with what you divide it by:

Margin = (Price – Cost) ÷ Price

Markup = (Price – Cost) ÷ Cost

Margin shows profit as a share of the selling price; markup shows the rate added on top of cost. To convert one into the other:

Margin = Markup ÷ (1 + Markup)

Markup = Margin ÷ (1 – Margin)

Both formulas are algebraic rearrangements of the definitions above. To go straight from a target margin to a price, use **Price = Cost ÷ (1 – Margin)**.

Example: On an FCL quote, the buy rate is USD 2,000 and origin local charges are USD 300. Total cost is USD 2,300.

Method	Calculation	Selling price	Profit	Margin	Markup
20% markup added	2,300 × 1.20	USD 2,760	USD 460	16.67%	20%
20% margin targeted	2,300 ÷ 0.80	USD 2,875	USD 575	20%	25%

If management has set a "20% margin" target and the sales team adds 20% on top of cost, every USD 2,300 quote falls USD 115 short. Agree in writing, inside the company, whether the target is a margin or a markup.

Markup	Equivalent margin	Margin	Equivalent markup
10%	9.09%	10%	11.11%
15%	13.04%	15%	17.65%
20%	16.67%	20%	25.00%
25%	20.00%	25%	33.33%
50%	33.33%	30%	42.86%

Contribution margin, fixed and variable costs

A single quote looking profitable does not mean the business as a whole is. For a branch, a product line or a trade lane, you need this distinction:

- **Variable cost:** cost that rises with the number of shipments. The buy rate, local charges, per-shipment commission and insurance, for example.
- **Fixed cost:** cost that stays the same regardless of shipment numbers within a given range of activity. Staff, office rent, software licences. If volume grows so much that a new team or vehicle is needed, fixed cost rises in a step.
- **Contribution margin:** what is left of sales after variable costs. It covers fixed costs first; anything left over is profit.

> **Contribution margin per unit = Selling price per unit – Variable cost per unit**
>
> **Contribution margin ratio = Contribution margin per unit ÷ Selling price per unit**

The contribution margin ratio is the margin calculated on variable cost. In this example and in the calculator, "margin %" and "contribution ratio" mean the same thing.

Example (all amounts in USD): A product line sells at an average of USD 1,250 per shipment on a given trade lane. Variable cost per shipment (buy rate and variable charges) is USD 1,000. The line's monthly fixed cost is USD 18,600, and it handles 80 shipments a month.

Indicator	Calculation	Result
Contribution per shipment	1,250 – 1,000	USD 250
Contribution ratio (margin)	250 ÷ 1,250	20%
Equivalent markup	250 ÷ 1,000	25%
Total monthly contribution	80 × 250	USD 20,000
Monthly profit	20,000 – 18,600	USD 1,400

The break-even point

The break-even point is the level at which total revenue equals total cost, with neither profit nor loss:

> **Break-even (units) = Fixed cost ÷ Contribution margin per unit**
>
> **Break-even (sales) = Fixed cost ÷ Contribution margin ratio**

Step	Calculation	Result
Break-even shipments	18,600 ÷ 250	74.4 → **75 shipments**
Break-even sales	18,600 ÷ 0.20	USD 93,000

Step	Calculation	Result
Result at 74 shipments	74 × 250 − 18,600	−USD 100
Result at 75 shipments	75 × 250 − 18,600	+USD 150

There are no half shipments, so always round up. This line runs 80 shipments a month, just 5 above break-even. If volume drops by 6, the line goes into loss.

Step	Calculation	Result
Contribution per shipment	1,250 − 1,000	250
Contribution ratio (margin)	250 ÷ 1,250	20.0%
Markup on cost	250 ÷ 1,000	25.0%
Break-even shipments	18,600 ÷ 250	75
Monthly profit / loss	80 × 250 − 18,600	1,400

Profitability of a single quote

The gross profit on a quote is simple: selling price minus buy cost. To make sure that difference survives once the quote is accepted, check a few points:

- **Make sure every surcharge is on both the buy and the sell side.** If the carrier bills items such as BAF, PSS or ETS separately and you gave the customer an "all-in" price, every later increase comes out of your margin. State clearly which items are included. For what each item means, see **Freight quotations and surcharges**.
- **Align validity periods.** If your buy rate expires at the end of the month, giving the customer a sell rate valid for 60 days means taking on the price risk yourself. Tie the validity of your quote to that of your buy rate, or price the risk in.
- **Allow for exchange rates.** If costs are in one currency and the sale in another, your margin moves with the rate.

Currency risk example: In the quote above, let the buy rate be EUR 1,850, local charges USD 300 and the selling price USD 2,875. At EUR/USD 1.08, cost is USD 2,298 and the margin about 20.07%. If the rate rises to 1.12, cost goes up to USD 2,372 and the margin falls to about 17.50%. USD 74 per quote has gone without any change in price. The carriers' CAF exists to solve the same problem on their side.

Spare capacity and the "special price" decision: Managerial accounting frames the special order decision like this: if there is spare capacity and the order does not change fixed costs, any price above variable cost makes a contribution. If capacity is full, the extra cost of the job and the other customers it would displace also count. This logic explains quoting low for vehicle or container space that would otherwise run empty. It has a price, too: regular customers who hear about it may ask for the same rate.

The discount trap: A price cut reduces contribution by a much larger percentage. On the example line, a 5% discount brings the price to USD 1,187.50 and the contribution to USD 187.50. To keep the same USD 1,400 monthly profit you need (18,600 + 1,400) ÷ 187.50 = 106.7, i.e. **107 shipments**. That is about 34% more volume than 80 shipments. Break-even also rises from 75 to 100 shipments.

Spreadsheet decision models

All of the calculations above can go into a spreadsheet. Management science textbooks recommend building a good spreadsheet model from four parts:

Part	What it means	Logistics example
Inputs	Values outside your control that enter as data	Buy rates, exchange rates, fixed costs, demand
Decision variables	Values you choose	Selling price, how many trips to run on each lane, which vehicle goes to which job
Output / objective	The result you want to measure or optimise	Monthly profit, total contribution, total transport cost
Constraints	Limits that must be respected	Vehicle and driver capacity, customer demand, delivery deadlines

Practical rules: keep inputs in separate, coloured cells; never type numbers inside formulas; do each calculation in one place only. Then when you change an input, the whole model updates itself.

Sensitivity analysis: "what if?"

Sensitivity analysis shows how much the result changes when an input changes. In Excel, **What-If Analysis** on the Data tab offers three tools:

- **Scenarios:** named sets of inputs changed together (optimistic, expected, pessimistic and so on).
- **Goal Seek:** works backwards to find the input needed for the result you want. Set profit to zero, for example, to find break-even volume.
- **Data Table:** shows the result for different values of one or two inputs in a single table. For more than two variables, use scenarios.

Monthly profit (USD) for the example line, as a two-variable data table of price and volume:

Shipments per month ↓ / Price →	1,200	1,225	1,250	1,275	1,300
70	−4,600	−2,850	−1,100	650	2,400
75	−3,600	−1,725	150	2,025	3,900
80	−2,600	−600	**1,400**	3,400	5,400
85	−1,600	525	2,650	4,775	6,900
90	−600	1,650	3,900	6,150	8,400

The table makes one thing plain: a USD 25 price difference per shipment has more effect than a 5-shipment difference in volume. Worth knowing at the negotiating table.

Linear programming and Solver

When a decision runs into several constraints at once, trial and error is not enough. **Linear programming** finds the values of the decision variables that maximise or minimise a linear objective (such as total contribution) subject to linear constraints. In Excel, the **Solver** add-in does this: you define the objective cell, the decision cells to change and the constraints. If all relationships are linear, choose **Simplex LP** as the solving method.

Example: A small fleet has 42 vehicle-days of capacity a week. There is work on two lanes:

	Lane A	Lane B
Contribution per trip	USD 400	USD 600
Vehicle-days per trip	2	4
Maximum weekly demand	15 trips	8 trips
Contribution per vehicle-day	USD 200	USD 150

Model: maximise total contribution = 400 × A + 600 × B, subject to 2A + 4B ≤ 42, A ≤ 15, B ≤ 8, with A and B not negative.

Corner points of the feasible region:

Lane A trips	Lane B trips	Vehicle-days used	Total contribution
0	0	0	USD 0
15	0	30	USD 6,000
15	**3**	**42**	**USD 7,800**
5	8	42	USD 6,800
0	8	32	USD 4,800

The best solution is 15 trips on A and 3 on B, for a total contribution of USD 7,800. Requiring whole-number trips does not change the result. Intuition misleads here: a B trip appears to earn more, but the scarce resource is vehicle-days, and per vehicle-day A is more profitable. Managerial accounting calls this the "contribution per constrained resource" rule. One more capacity signal: Solver's sensitivity report shows a shadow price of USD 150 for the vehicle-day constraint, so each extra vehicle-day is worth at most USD 150, the ceiling for hiring in an outside vehicle. With whole-number trips, that value is realised as USD 600 for one more 4-vehicle-day trip on B.

Real problems have many more variables and constraints (vehicle types, driver hours, route sequence). The structure is the same. Where trips must be whole numbers, add an integer constraint in Solver.

Uncertainty: scenarios and Monte Carlo

The models above treat inputs as certain. In reality both volume and buy rates fluctuate. **Monte Carlo simulation** gives uncertain inputs a probability distribution and runs the model thousands of times to show the distribution of results. In Excel you can use the RAND and RANDBETWEEN functions to generate random numbers and a data table to repeat the trials.

Example: Let monthly shipments be any whole number from 70 to 90 and variable cost per shipment any value from USD 950 to USD 1,050, all equally likely. Price is USD 1,250 and fixed cost USD 18,600. In a 10,000-trial simulation, average monthly profit comes out at about USD 1,400, but the line makes a loss in roughly one month in three. The worst case is about –USD 4,600 and the best about USD 8,400. Repeated runs put the probability of a loss at around 33–34% each time.

A single "expected" figure says USD 1,400 profit. The simulation shows how fragile that profit is. Cutting fixed costs or securing a volume commitment reduces the risk.

Logistics costs and performance indicators

You cannot set a price properly without knowing your costs, yet in logistics much of the cost never shows up on the buy side of a single quote. This section sums up where costs come from, how shared overheads can be assigned to customers and how service can be measured.

The main components of logistics cost

CSCMP's annual *State of Logistics* report splits US business logistics costs into transportation, inventory carrying (including warehousing and the cost of capital) and other costs. According to SCDigest's summary of the 2026 report, on 2025 data transportation made up 61.8% of the total and inventory carrying costs 30.4% (secondary source; last checked November 2026). The table below opens up the same logic from the point of view of a logistics company or an exporter:

Component	What it covers	What drives it
Transport	Freight, pre- and on-carriage, local charges, surcharges	Volume, distance, mode, market rates
Warehousing and handling	Warehouse rent or depreciation, staff, equipment, storage charges	Space, time in stock, number of movements
Inventory carrying cost	Cost of capital tied up in stock, insurance, shrinkage, obsolescence	Average stock value and time held
Administration and order processing	Planning, customer service, documents, IT systems, customs formalities	Number of orders and shipments, complexity

These components affect each other. Adding warehouses can cut transport cost while raising inventory carrying cost; a faster but dearer mode reduces stock in transit. That is why you track **total cost**, not one component. For the role of carrying cost in the EOQ calculation, see **Warehousing and inventory management**.

Activity-based costing: which customer really makes money?

In the contribution margin calculation above, fixed costs are deducted from the line as a whole. But two customers leaving the same contribution can take up very different amounts of the operations team's time. **Activity-based costing (ABC)** assigns shared overheads according to the activities that cause them. The OpenStax managerial accounting textbook sets the method out in five steps: identify the activities, collect each activity's costs in a cost pool, choose a cost driver for each pool and calculate the activity rate, apply the rate to each customer or product according to its use, and work out the unit cost.

(Note: ABC here should not be confused with ABC analysis in inventory classification.)

Example (all amounts in USD, per month): The shared costs of a forwarding branch's operations team are USD 30,000. The branch handles 400 shipments a month in total.

Activity	Cost pool	Cost driver	Monthly driver total	Activity rate
Booking and order processing	12,000	Number of bookings	400	USD 30 per booking
Documents and customs preparation	9,000	Number of document sets	300	USD 30 per set
Changes and problem handling	9,000	Problem tickets opened	150	USD 60 per ticket

Customers X and Y each ship 40 times a month and leave USD 75 of contribution per shipment, so USD 3,000 a month each.

	Customer X	Customer Y
Bookings	40 × 30 = 1,200	40 × 30 = 1,200
Document sets	40 × 30 = 1,200	20 × 30 = 600
Problem tickets	30 × 60 = 1,800	2 × 60 = 120
Activity-based cost	**4,200**	**1,920**
Contribution – cost	3,000 – 4,200 = **–1,200**	3,000 – 1,920 = **+1,080**
Equal allocation per shipment (30,000 ÷ 400 = USD 75 per shipment)	3,000 – 3,000 = 0	3,000 – 3,000 = 0

Allocating equally per shipment makes the two customers look the same. The activity-based view shows that X keeps the team busy with frequent changes and problems, while Y is profitable. The answer need not be losing X: adding an amendment fee to the price, simplifying the document process or fixing the root cause of the problems are options too.

Performance indicators (KPIs)

Price and cost do not tell you how well the service is delivered. For that you need to track a few indicators regularly. Inventory turnover and order fill rate are covered in **Warehousing and inventory management**; here we look at delivery and cost.

Example: In one month 200 shipments were delivered. 184 arrived on the requested date and 190 were complete; 178 were both on time and complete. 197 arrived undamaged. Over the same period logistics cost was USD 420,000 and sales USD 6,000,000.

Indicator	Formula	Example
On-time delivery rate	Delivered on the requested date ÷ total deliveries	184 ÷ 200 = 92%
In-full delivery rate	Delivered complete ÷ total deliveries	190 ÷ 200 = 95%
On time in full (OTIF)	Both on time and complete ÷ total deliveries	178 ÷ 200 = **89%**
Damage-free delivery rate	Delivered undamaged ÷ total deliveries	197 ÷ 200 = 98.5%
Logistics cost as a share of sales	Logistics cost ÷ sales	420,000 ÷ 6,000,000 = 7%

Two warnings:

- **OTIF is not the product of the two rates.** 92% × 95% ≈ 87.4%; true OTIF checks whether both conditions are met on the same shipment, and here it is 89%. Check each shipment individually.
- **Agree the definition in writing.** A 2019 McKinsey survey in the consumer sector found that companies define OTIF differently: measuring at order, line or case level, whether "on time" is judged against the customer's requested date or a committed date, and how many days of tolerance are allowed all change the result. If you and your customer do not use the same definition, you will end up arguing over two different OTIF figures for the same month.

Keep the number of indicators small, the definitions clear and the data reliable. In price negotiations these figures are often the strongest way to show service quality; for value-based pricing, see the table at the top of this page.

Where to go next in the guide

- The items in a quote: **Freight quotations and surcharges**
- The freight calculation itself: **FCL, LCL and freight calculation**, **Air cargo: the AWB and chargeable weight**, **Road vehicle types and loading metres**
- Responsibilities included in the price: **Incoterms® 2020**
- Collection and payment risk: **Payment methods and letters of credit**
- Another spreadsheet model: **Warehousing and inventory management** (EOQ)

Test yourself

1. A quote has a total cost of USD 1,600 and the target margin is 25%. What are the selling price and the equivalent markup? *(Answer: 1,600 ÷ 0.75 ≈ USD 2,133.33; profit ≈ USD 533.33, markup ≈ 33.33%.)*
2. A salesperson adds 25% on top of cost. What is the margin? *(Answer: 0.25 ÷ 1.25 = 20%.)*

3. A lane has monthly fixed costs of USD 12,000 and a contribution of USD 160 per shipment. How many shipments a month are needed to break even? *(Answer: 12,000 ÷ 160 = 75 shipments.)*
4. In the linear programming example, why are Lane A trips filled first even though a Lane B trip earns more? *(Answer: The scarce resource is vehicle-days; contribution per vehicle-day is USD 200 on A and USD 150 on B.)*

Frequently asked questions

What is the difference between margin and markup?

Both show the same amount of profit but divide it by a different base. Margin divides profit by the selling price; markup divides it by cost. Add a 20% markup to a quote costing USD 2,300 and the price is USD 2,760, but the margin is only about 16.67%. To convert, use margin = markup ÷ (1 + markup) and markup = margin ÷ (1 − margin).

What is contribution margin, and is it the same as gross profit?

Contribution margin is what is left of sales revenue after variable costs; it covers fixed costs first, and anything left over is profit. For a single quote, selling price minus buy cost equals the contribution margin if all variable costs sit on the buy side. If there are other per-shipment variable costs, such as commission, insurance or bank charges, deduct them as well.

How is the break-even point calculated?

Break-even point = fixed cost ÷ contribution margin per unit. For a lane with monthly fixed costs of USD 18,600 and a contribution of USD 250 per shipment, the result is 74.4, rounded up to 75 because there are no half shipments. At 74 shipments there is a loss of USD 100; at 75 a profit of USD 150.

What does Excel Solver do?

Solver is an Excel add-in that maximises or minimises an objective cell (such as total contribution) by changing decision cells (such as how many trips to run on each lane) while respecting constraints. When all relationships are linear, the Simplex LP method is used. Logistics decisions such as capacity, vehicle assignment and routing can be modelled this way.

How much more do you need to sell to cut the price by 5%?

It depends on the contribution ratio, and it is far more than most people expect. On a lane priced at USD 1,250 per shipment with a variable cost of USD 1,000, a 5% discount cuts the contribution from USD 250 to USD 187.50. To keep the same monthly profit, shipments must rise from 80 to 107, roughly a third more.

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