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Defect Cost Calculator + QC Checklist

The Hidden Margin Killer: How Defects Quietly Destroy Your Profits

A boardroom-ready toolkit for Operations Directors, Procurement Managers & Supply Chain VPs.
Measure true cost of poor quality · Rank defects by margin loss · Justify prevention spend.

60–90 min with live order data	**Two cost buckets** Internal + External failures	**Prevention ROI** up to 294% in example	**AQL-ready** QC lifecycle map

1. Prerequisites — What to Pull Before the Audit

Budget 60–90 minutes. Export everything to CSV before any calculations. Use actual invoices, not quoted costs. Anonymize supplier names in any shared outputs.

[ ] **Order economics:** PO volume, selling price (or transfer price), landed unit cost — from actual invoices.

[ ] **Quality metrics:** Scrap rate, rework hours. Use finance-approved definitions for major vs minor defects (see AQL).

[ ] **Post-shipment costs:** Inspection cost, replacement freight, return cost, refund/credit cost — from CS logs & marketplace dashboards.

[ ] **Churn estimate:** Last 3–12 months if available. Keep one comparable SKU or batch family together.

[ ] **Access needed:** Read-only ERP, QC reports, customer-service logs, return data.

Expert Take: Export raw CSVs before any pivot table. This prevents rework.

2. Split Defect Costs into Two Buckets

Internal failure costs + External failure costs = True Cost of Poor Quality. Internal failures hit gross margin first. External failures destroy net margin and brand trust later.

Internal failures happen before shipment. External failures happen after shipment.

INTERNAL FAILURES (Pre-shipment)	EXTERNAL FAILURES (Post-shipment)
[ ] Scrap / write-off	[ ] Returns & warranty claims
[ ] Rework labor + materials	[ ] Chargebacks / marketplace fees
[ ] Re-inspection	[ ] Air-freight replacements
[ ] Downgrade (lower selling price)	[ ] Disposal / FBA removal fees
[ ] Lost machine time / idle capacity	[ ] Lost reorder velocity
[ ] Extra packaging labor	[ ] Customer churn reserve
[ ] Scheduling disruption	[ ] Logistics penalties

Author's Take: Separating pre-shipment from post-shipment reveals at least one hidden external cost in the first pass.

3. Attach a Dollar Value to Every Defective Unit

Defective-unit cost = consumed material + direct labor + absorbed overhead + re-inspection + rework or replacement + extra freight + return/disposal/admin + realistic churn reserve.

Outcome	What to add

Salvageable by rework	Rework labor + re-inspection + scheduling delay
Sellable at downgrade	Original landed cost – lower selling price
Full write-off	Material + labor + overhead + disposal (no recovery)

4. Defect Cost Calculator — Your Inputs

Fill the fields below using one live SKU / batch. Then compute the totals. Verify: Good units + Defect units = full PO quantity. Total calculated cost should reconcile within ~5% of batch spend.

Field	Your Value	Notes / Source
Batch / PO size (units)	_____	From PO / ERP
Selling price per unit ($)	_____	Invoice or transfer price
Landed cost per unit ($)	_____	Actual invoices, not quotes
Scrap / defect count	_____	QC reports
Rework labor hours	_____	Production / finance
Rework labor rate ($/hr)	_____	Fully loaded rate
Re-inspection cost ($)	_____	Fixed + variable
Replacement production ($/unit)	_____	If re-made
Expedited freight differential ($)	_____	Air vs sea, etc.
Customer return cost ($/unit returned)	_____	CS + logistics
Return / leak rate (%)	_____	% of defects that reach customer
Logistics / marketplace penalty ($)	_____	Once threshold exceeded
Churn reserve ($)	_____	Most underfilled field
FBA / disposal fees if applicable ($)	_____	Amazon / Walmart sellers

Author's Take: The churn reserve is the most underfilled field. In audits it can nearly double true batch cost.

5. Side-by-Side Batch Example (Worked)

Identical 10,000-unit batches for the same SKU. Only defect rate changes: 0.5% vs 5%. Assumptions: Selling price $60/unit · Landed cost $32/unit · Factory scrap $18/unit · Replacement $20/unit · Re-inspection $800 fixed + $4/defective unit · Customer return $150 per unit that reaches customer (20% leak) · Air freight differential $9/unit · Logistics penalty $2,500 once defects exceed 2%.

Cost Layer	Batch A 0.5% defect	Batch B 5% defect
Revenue	$600,000	$600,000
Core landed cost	$320,000	$320,000
Defective units	50	500
Factory scrap / rework	$900	$9,000
Re-inspection	$1,000	$2,800
Replacement production	$1,000	$10,000
Expedited air freight	$0	$4,500
Customer credits / returns	$1,500	$15,000
Logistics penalty	$0	$2,500
Total defect cost	$4,400	$43,800
Net profit	$275,600	$236,200
Net profit margin	45.93%	39.37%

Key insight: Margin drops 6.56 percentage points. Revenue stays the same. A 10× jump in defect rate triggered air freight and a logistics penalty. Manager Zhang (Lead QC): “The logistics penalty only appears when defects exceed 2%. That is when we lose sea freight consolidation.”

Marketplace note: For Amazon / Walmart sellers, add FBA removal or disposal fees. In Batch B, 100 returned units can add ~$2,000 in fees and push net margin below 39%.

6. Rank Defects by Margin Loss (Not Frequency)

Severity score = defect frequency × recovery cost × customer impact (0–5). Rank primarily by total margin loss. Frequency alone often points to the wrong fix.

Defect Code	Freq.	Unit Recovery Cost	Total Loss	Cumulative %
410 failed bar-tack	2	$3,200	$6,400	86%
319 crushed carton	4	$220	$880	98%
204 broken zipper	12	$14	$168	100%
112 label misalignment	38	$0.50	$19	100%
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

Repeat the ranking by SKU, Supplier, and Defect Code. The top few categories must explain the majority of loss. If they do not, your coding is too generic — split broad codes into exact failure modes.

Author’s Take: I rank by margin loss first. In my experience, the most frequent defect is rarely the most expensive.

7. Lifecycle Map — Origin & Escape Point Checklist

For each priority defect from Step 6, answer three questions at every stage: (1) Where was it created? (2) Where could it have been caught earlier? (3) Why did the control fail? Every priority defect must have a documented origin point and escape point.

Stage	Key Control Questions (check off)	Owner
Supplier Qualification	[ ] Factory audit checklist present? NNN / compliance files? Capability match?	_____

Incoming Materials	[ ] Material lot change logged? Incoming inspection performed? Lab vs factory test data?	_____
Inline Production	[ ] Process capability known? Shift / line segmentation? First-pass yield tracked?	_____
During-Production Inspection (DUPRO)	[ ] 25% / 50% / 75% checkpoints done? Photo evidence captured?	_____
Final Inspection (PSI / AQL)	[ ] AQL 1.5 / 2.5 applied correctly? Major vs minor classification consistent?	_____
Packaging	[ ] ISTA / drop / crush tests? Carton strength matched to product weight? Label accuracy?	_____
Loading & Export	[ ] Loading supervision? Container condition photos? Consolidation rules followed?	_____
Post-Arrival Handling	[ ] Inbound QC sample? Customer feedback loop closed within SLA?	_____

Author's Take: Mapping origin and escape points exposes at least one broken handoff within an hour. Missing escape points are more common — controls exist but fail silently.

8. Prevention-First ROI Model

Stop presenting defect costs as bad luck. Present them as a return on prevention. External failures always cost more than prevention. Build the table below for your board (≈45 min after data is clean).

Control	Approx. Cost	Avoided Loss Example	ROI	Your Cost	Your Avoided
Inline QC	$2,500	$9,000 scrap/rework	3.6×	_____	_____
DUPRO	$1,800	$6,000 pre-shipment defects	3.3×	_____	_____
PSI (AQL)	$1,200	$4,000 final AQL failures	3.3×	_____	_____
Packaging tests	$800	$4,500 crush damage	5.6×	_____	_____
Lab tests	$600	$7,000 material failure	11.7×	_____	_____
Supplier audits	$2,000	$10,000 supplier defects	5.0×	_____	_____
Operator training	$1,100	$3,300 rework	3.0×	_____	_____
TOTAL PREVENTION	**$10,000**	**$39,400 avoided**	**294%**	_____	_____

Example: Total prevention package $10,000 · Total avoided loss $39,400 · Net saving per 10,000-unit batch $29,400 · ROI 294%. Every control needs an owner, a target defect reduction, and a payback expectation.

Contract Layer (define these in writing)

- [ ] AQL thresholds (commonly 1.5 / 2.5) and sampling plans
- [ ] Rework obligations and who pays for them
- [ ] Replacement responsibility and lead-time SLA
- [ ] Credit / chargeback triggers and calculation method
- [ ] Corrective-action timelines and escalation path

9. Troubleshooting Common Objections

"Our scrap rate looks low…"

Scrap is only one leak. Pull rework, re-inspection and air-freight from other cost centers into one view. A 1.2% scrap can hide a true defect cost of 4.7% of landed cost.

"We don't have perfect data…"

Start with one SKU family, one supplier, 90 days. Use conservative assumptions. Directional accuracy is enough to prioritize the top two fixes.

"Supplier credits make it look resolved…"

Compare the credit to full landed + admin + churn. If the credit covers <30% of total downstream cost, treat the issue as unresolved.

"Procurement, QC and Finance use different definitions…"

Create one shared defect codebook. Force every inspector to log the exact same code in one ERP field. Attach one owner to each cost line.

"Inspection spending feels like overhead…"

Tie every control to one loss mode and expected savings. In the example above, $10k in inspections avoided $39.4k — a 294% return, not overhead.

10. One-Page QC Action Checklist

Use this after ranking defects. Check each item before the next production run.

[ ] 1. Top 3 defect codes by total margin loss identified and shared with supplier & internal owners
[ ] 2. Origin point and escape point documented for each priority defect
[ ] 3. AQL thresholds (or equivalent) written into the purchase order / quality agreement
[ ] 4. Inline / DUPRO / PSI owners named with target defect-rate reduction and review date
[ ] 5. Packaging test standard (ASTM/ISTA or equivalent) confirmed for high-risk SKUs
[ ] 6. Churn reserve and post-shipment cost lines added to the next batch cost model
[ ] 7. Shared defect codebook published; all teams using the same codes in the ERP
[ ] 8. Prevention ROI table reviewed with Procurement, QC and Finance in one meeting
[ ] 9. Next 90-day pilot SKU selected and data export scheduled
[ ] 10. Corrective-action timeline and escalation path agreed in writing with the supplier

This framework is based on operational experience and anonymized client patterns. LeelineGroup is a professional China-based sourcing and supply chain agency (Hong Kong registered since 2009). We provide one-stop procurement solutions — product sourcing, factory auditing, multi-stage quality control, and global logistics — for brands that need direct, strategic control of their Asian manufacturing.