

Hardware Operating Model Diagnostic

A synthetic diagnostic for a hardware company moving from prototype demand to repeatable production, built to expose margin leakage, inventory risk, MOQ constraints, warranty drag, and channel economics.

Buyer problem

Founder has revenue traction but cash keeps disappearing into inventory, freight, returns, and channel discounts.

Work product

SKU economics model, inventory bridge, working capital forecast, MOQ planner, margin waterfall, and action memo.

Data status

Generic company name and synthetic data. No client records.

1. Diagnostic Readout

REPORTED GM 38% Before hidden fulfillment and warranty costs	TRUE CONTRIBUTION 21% After freight, payment fees, warranty, returns	CASH CONVERSION 142 days Inventory to cash collection cycle	INVENTORY RISK \$1.6M Slow-moving and MOQ-driven exposure
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The model separates accounting gross margin from cash contribution by channel and SKU. That distinction gives the operator a cleaner answer on what to sell, where to sell it, and how much inventory to buy.

Problem	Model treatment	Operating decision
SKU margin is overstated	Landed cost, freight, pick-pack, platform fees, warranty, and returns by SKU.	Retire or reprice low-contribution bundles.
Inventory buy is too lumpy	MOQ, lead time, demand variability, and safety stock by supplier.	Split purchase orders and negotiate lower MOQ for volatile SKUs.
Channel mix hides leakage	Direct, marketplace, wholesale, and distributor waterfalls.	Shift spend toward channels with repeatable contribution.
Cash forecast misses stockouts	Unit-level demand forecast tied to inventory receipts and sell-through.	Time purchase orders before stockout, not after the bank balance drops.

The highest-value output is a SKU-level cash truth table. It turns a broad margin complaint into specific pricing, purchasing, and channel decisions.

2. SKU And Channel Economics

SKU Contribution

SKU family	ASP	Landed cost	True contribution	Read
Core device	\$189	\$91	31%	Scale with controlled freight.
Starter bundle	\$229	\$143	18%	Reprice or simplify components.
Accessory kit	\$49	\$14	45%	Use as margin repair lever.
Replacement part	\$29	\$8	26%	Keep for retention, not acquisition.

Channel Waterfall

Channel	Gross margin	Fees and freight	Return drag	Contribution
Direct	52%	(14%)	(4%)	34%
Marketplace	48%	(22%)	(6%)	20%
Wholesale	36%	(5%)	(2%)	29%
Distributor	28%	(3%)	(1%)	24%

Margin Bridge

Bridge item	Impact	Management implication
Book gross margin	38%	Starting point from accounting records.
Inbound freight and duties	(6%)	Supplier routing and container utilization need ownership.
Fulfillment and payment fees	(7%)	Channel mix affects contribution, not just revenue.
Warranty and returns	(4%)	Quality and onboarding improvements pay back quickly.
True contribution margin	21%	Pricing and purchase orders must use this view.

3. Working Capital Controls

Purchase Order Planner

Supplier	Lead time	MOQ	Recommended action
Supplier A	90 days	8,000 units	Negotiate split shipments before holiday build.
Supplier B	45 days	2,500 units	Maintain due to reliable replenishment.
Supplier C	120 days	12,000 units	Dual-source or cap exposure until velocity proves out.

Control Dashboard

Metric	Target	Current	Action
Inventory turns	4.5x	2.8x	Freeze low-velocity buys.
Stockout risk	<5%	14%	Pull forward core device PO.
Return rate	<6%	9%	Fix onboarding and packaging.
Contribution margin	>28%	21%	Reprice starter bundle.

The working capital answer is a control system: PO timing, supplier policy, inventory targets, and channel profitability all have to point at the same cash forecast.

4. Warranty, Returns, And 90-Day Action Plan

Warranty And Returns Funnel

Funnel step	Rate	Cost driver
Units shipped	100%	Baseline denominator for cohort analysis.
Returned units	9.0%	Refunds, freight, and restocking labor.
Valid claims	4.8%	Replacement unit, outbound freight, and support time.
No-fault-found	2.3%	Onboarding and product education issue.
Scrap or write-off	1.1%	Quality reserve and batch-level root cause.

Cost Of Quality

Cost bucket	Annual cost	Control action
Replacement units	\$310K	Batch-level failure tracking.
Return freight	\$145K	Channel policy and troubleshooting gate.
Refund leakage	\$220K	Separate true defects from buyer remorse.
Refurb labor	\$95K	Standardize intake and resale disposition.

30 / 60 / 90-Day Action Plan

Timing	Finance deliverable	Operating decision enabled
30 days	SKU and channel margin rebuild, inventory aging, warranty reserve.	Stop shipping revenue that destroys contribution.
60 days	MOQ policy, purchase approval thresholds, demand planning cadence.	Buy inventory by cash return and stockout risk.
90 days	Board KPI pack, supplier scorecard, channel profitability governance.	Institutionalize the controls after the diagnostic.

Best-fit proposal use: attach this for hardware startups, consumer products, inventory planning, SKU profitability, gross margin cleanup, cash forecast, and operating model diagnostic jobs.