

Unused Capacity Decomposition in supply chain management (cold chain)

Component	Instances of Unused Capacity	KPI Impacted	Why It Matters
Cold Storage Infrastructure	Warehouse at 60% fill rate while energy costs remain constant	Space utilization rate, cost per pallet	Fixed energy costs lead to poor ROI
Reefer Transport	Half-full refrigerated trucks on return legs	Load factor, delivery cost per ton/km	Doubles cost per delivery
Manpower (Skilled Cold Chain Staff)	Trained technicians idle due to low throughput or automation	Labor utilization, handling cost/unit	Wasted payroll or low morale
Temperature Monitoring Systems	IoT sensors installed but not actively monitored or integrated with alerts	Incident response time	Risk of unnoticed excursions
Packaging Infrastructure	Dry ice packaging station underused due to SKU change or drop in exports	Asset utilization	Capital tied up, training wasted

Import/Export Dock Slots	Custom-cleared goods wait for reefer slots despite available dock time	Dwell time, container holding costs	Cold chain break risk
IT Systems (e.g., WMS/TMS)	Advanced systems like WMS not configured for FEFO or temp alerts	Digital maturity	Prevents real- time decisions