**Sources used**

* Journal of Management Research paper (technology → sustainability study). [Journal of Administrative Research](https://jso.journals.ekb.eg/article_274256_69f232e049e0bdb35deb4d54c0109284.pdf)
* “Impact of Sustainable Supply Chain Management Practices on Egyptian Companies’ Performance” (ResearchGate). [ResearchGate](https://www.researchgate.net/publication/332262204_Impact_of_Sustainable_Supply_Chain_Management_Practices_on_Egyptian_Companies%27_Performance)
* Egypt Sustainable Development Strategy (Egypt Vision 2030, UNESCWA). [andp.unescwa.org](https://andp.unescwa.org/sites/default/files/2020-09/Sustainable%20Development%20Strategy%20%28SDS%29%20-%20Egypt%20Vision%202030.pdf?utm_source=chatgpt.com)

**Inputs / baseline numbers (from Our Data)**

* **Total transport cost (Orders.xlsx):** **201,476,643,893 EGP**
* **Total manufacturing costs:** **7,100,454,090,183 EGP**
* **Total production volumes (packs):** **12,179,955,787 packs**

### S1 — Infrastructure + Route Optimization

**Event:** Investments in port / rail connectivity → average sea lead times −15%, domestic road lead times −10%; sea/rail transport costs −10% (road unchanged or modestly reduced).  
**Source evidence:** Egypt’s SDS/Vision 2030 emphasizes infrastructure & modal capacity improvements and targets for transport modernization (ports/rail), supporting faster sea/rail throughput and modal shifts. [andp.unescwa.org](https://andp.unescwa.org/sites/default/files/2020-09/Sustainable%20Development%20Strategy%20%28SDS%29%20-%20Egypt%20Vision%202030.pdf?utm_source=chatgpt.com)  
**Numeric effect on your totals (EGP):**

* Sea/rail cost reduction = **−10%** \* (sea/rail share of transport cost).
  + If sea/rail = **20%** → reduction = **~4.03 billion EGP**.
  + If sea/rail = **40%** → reduction = **~8.06 billion EGP**.  
    (Computed from 201.48B EGP \* sea/rail\_share \* 0.10.)

**Reflections on other numbers:**

* Lead time reduction (sea −15%, road −10%) reduces inventory days and carrying cost (not computed without inventory data), improves on-time delivery metrics in Orders; could increase fill rates and allow lower safety stock (reduce working capital).
* Source (tech & practices) shows such improvements are realistic where infrastructure & digital route planning are implemented. [Journal of Administrative Research+1](https://jso.journals.ekb.eg/article_274256_69f232e049e0bdb35deb4d54c0109284.pdf)

### S2 — Urban Consolidation + Last-Mile Optimization

**Event:** Consolidation centers in Cairo/Alexandria aggregate shipments → last-mile transport cost −20%, last-mile lead time −30%; emissions per urban delivery drop because fewer trips.  
**Source evidence:** Both SSCM practical studies and Egypt urban policy emphasize consolidation/logistics hubs and last-mile measures to reduce urban congestion & emissions; the ResearchGate work links SSCM practices to cost and performance improvements. [ResearchGate+1](https://www.researchgate.net/publication/332262204_Impact_of_Sustainable_Supply_Chain_Management_Practices_on_Egyptian_Companies%27_Performance)  
**Numeric effect on your totals (EGP):**

* If last-mile = **25%** of transport cost, then reduction = **201.48B \* 0.25 \* 0.20 = ~10.07 billion EGP** saved in transport costs.

**Reflections on other numbers:**

* Last-mile lead-time down 30%: fewer delivery failures / improved delivery predictability → likely reduction in expedited shipments & claims (lowers both transport and administrative costs in Orders).
* Emissions: fewer urban trips → proportional CO₂ drop for urban segment (we estimate CO₂ per km later if you want hard tons).

### S3 — Modal Shift (30% of domestic long-haul road → rail/river/sea)

**Event:** Shift 30% of domestic long-haul road volume to rail/sea; overall road transport cost per unit −15%; emissions fall significantly.  
**Source evidence:** UNESCWA & Vision 2030 drive modal integration; ResearchGate and SSCM literature show modal shift reduces unit transport cost & emissions where rail/river are competitive. [andp.unescwa.org+1](https://andp.unescwa.org/sites/default/files/2020-09/Sustainable%20Development%20Strategy%20%28SDS%29%20-%20Egypt%20Vision%202030.pdf?utm_source=chatgpt.com)  
**Numeric effect on your totals (EGP):**

* Road cost reduction (apply −15% to road share):
  + If road share = **60%** → reduction ≈ **18.13 billion EGP**.
  + If road share = **80%** → reduction ≈ **24.18 billion EGP**.  
    (Computed: 201.48B \* road\_share \* 0.15.)

**Reflections on other numbers:**

* Modal shift likely reduces lead-time variability and fuel/maintenance exposure; it may modestly extend some transit times but improves reliability and lowers cost and emissions (especially heavy bulk moves).
* The JSO tech/sustainability study supports that adopting such structural supply-chain changes raises economic & environmental sustainability. [Journal of Administrative Research](https://jso.journals.ekb.eg/article_274256_69f232e049e0bdb35deb4d54c0109284.pdf)

### S4 — Clean Fleet / Low-Emission Zones

**Event:** Adopt low-emission trucks / EVs for urban deliveries → transport cost **+5%** on urban legs but CO₂ per km **−60%** for urban legs. (Can be combined with S2.)  
**Source evidence:** Technology & sustainability literature supports fleet electrification reduces emissions dramatically but may incur slightly higher total cost initially. JSO paper emphasizes technology adoption tradeoffs (cost vs sustainability). [Journal of Administrative Research](https://jso.journals.ekb.eg/article_274256_69f232e049e0bdb35deb4d54c0109284.pdf)  
**Numeric effect on your totals (EGP):**

* Urban portion (assumed 25% of transport cost) \* +5% = **~2.52 billion EGP** additional transport cost (201.48B \* 0.25 \* 0.05).

**Reflections on other numbers:**

* Net effect if combined with S2: S2 cuts last-mile costs −20% (saves ~10.07B); S4 increases it +5% (~+2.52B), so combined last-mile net = **~−7.55B** (i.e., still a net saving).
* CO₂ per urban km falls ~60% — major environmental win (monetary value per ton depends on internal carbon price, if any).

### S5 — Circularity & Supplier Quality

**Event:** Supplier sustainability programs + reusable packaging → manufacturing cost −3% to −8%; reverse logistics cost −20%; defect rate down 20–50% depending on intensity.  
**Source evidence:** Research on SSCM practices shows supplier-engagement & circularity lower input quantities, improve quality, and reduce costs — ResearchGate paper demonstrates positive performance impacts from SSCM practices on Egyptian firms; the JSO paper also highlights supply-chain tech & practices for sustainability benefits. [ResearchGate+1](https://www.researchgate.net/publication/332262204_Impact_of_Sustainable_Supply_Chain_Management_Practices_on_Egyptian_Companies%27_Performance)  
**Numeric effect on your totals (EGP):**

* **Manufacturing cost reduction (range):**
  + **−3%** → **~213.01 billion EGP** saved (7.100T \* 0.03).
  + **−8%** → **~568.04 billion EGP** saved (7.100T \* 0.08).
* **Reverse logistics reduction (−20%)** assuming reverse-logistics ≈ 2% of manufacturing costs → saving ≈ **28.40 billion EGP** (7.100T \* 0.02 \* 0.20).
* **Defect/scrap improvements (20–50% reduction in defects):** if scrap-related cost ≈ 1.5% of manufacturing cost, then savings ≈ **21.30B to 53.25B EGP**.

A graph of a chart

AI-generated content may be incorrect.

### ****1. Transport Costs: Baseline vs After S1–S4****

* **Baseline Transport Cost:** ~201.5 billion EGP.
* **After applying S1–S4 (infrastructure, consolidation, modal shift, clean fleet):** ~166.7 billion EGP.
* **Net Saving:** ~34.8 billion EGP.
* The chart is a simple bar comparison — you see a tall bar for the baseline and a noticeably shorter bar for the “After” cost. The third bar (Net Saving) shows the amount saved, emphasizing the reduction.

**Interpretation:** Infrastructure improvements, modal shifts, and last-mile optimization can cut about **17% of transport costs**, even after including the small cost increase from EV adoption.

A graph of a cost

AI-generated content may be incorrect.

### ****2. Manufacturing Costs: Baseline vs After S5****

* **Baseline Manufacturing Cost:** ~7.10 trillion EGP.
* **After S5 (circularity & supplier quality):** ~6.66 trillion EGP.
* **Net Saving:** ~440.2 billion EGP.
* The chart has two very tall bars (baseline vs after), with the “After” bar slightly shorter — the difference is highlighted by a third bar showing the huge saving.

**Interpretation:** Circular economy practices, reusable packaging, and better supplier quality can reduce **manufacturing costs by ~6%**. Even small percentage improvements translate to hundreds of billions because of the massive cost base.

A graph with a number of bars

AI-generated content may be incorrect.

### ****3. Savings / Cost Impact by Scenario****

This bar chart breaks down each scenario’s individual contribution:

* **S1 (Infrastructure):** ~6.0 billion EGP saving (sea/rail improvements).
* **S2 (Urban consolidation):** ~10.1 billion EGP saving (last-mile efficiency).
* **S3 (Modal shift):** ~21.2 billion EGP saving (road → rail/sea).
* **S4 (Clean fleet):** ~−2.5 billion EGP (a cost increase due to EV adoption).
* **S5 (Circularity & suppliers):** ~440.2 billion EGP saving (by far the largest impact).

**Interpretation:**

* Transport scenarios (S1–S3) each give meaningful savings, but much smaller than S5.
* Clean fleet adoption (S4) raises costs slightly, but this can be offset when combined with S2.
* Overall, **S5 dominates** the financial impact, while S1–S3 provide solid transport efficiency gains.