Appendix D.

Applied Analyses and Empirical Cases for Noocratic Evaluation**

1. Market Efficiency and Externalities: The Fast-Fashion Case

Purpose

To demonstrate that low consumer prices arise due to **externalised costs** (water use, CO_2 emissions, waste generation, dye toxicity), and that *market efficiency ≠ social efficiency*.
This case directly supports the noocratic argument for **CEC-audit** and **IEKV-based valuation**.

Method (Flow-Accounting System)

System boundaries:
raw materials → yarn → fabric → garment manufacturing → warehouse → retail → consumption → recycling/landfill.

Tracked flows:
units (pcs), mass (kg), water (L), CO_2e (kg), chemical load (index), energy (kWh).

Key coefficients (for insertion into text):

- sell-through rate; recycling share; landfill/incineration share;
- return/markdown/destruction rate;
- water footprint per unit (WF), carbon footprint per unit (CF).

Balance Equations (simplified)

$$Q_{\text{prod}} = Q_{\text{purchased}} + Q_{\text{recycled}} + Q_{\text{disposed}}$$

$$WF_{\text{total}} = \sum Q_k \cdot WF_k$$

$$CF_{\text{total}} = \sum Q_k \cdot CF_k$$

Table D.3.x-A. Life-Cycle Flows for Jeans (Demo Values)

Indicator	Symbol	Demo Value*	Comment
Units produced	Q_{prod}	100	Normalised batch
Purchased by final consumers	$Q_{purchased}$	3–10	Your “~3 out of 100” lower bound; overstocks typical in fast-fashion
Recycled (down/re-cycling)	$Q_{recycled}$	20–40	Includes fiber/insulation; quality degradation common
Disposed (landfill/incineration)	$Q_{disposed}$	50–75	Unsold stock + returns + dead inventory
Water footprint, L/unit	WF	5,000–10,000	Cotton/polycotton variation, irrigation, dyes

Carbon footprint, kg CO_2e/unit	CF	15–30	Cotton/polyester + wash/dry energy
Energy per unit, kWh	EF	5–15	Fabric production / sewing / logistics

Demo ranges indicate orders of magnitude; real-data substitution is straightforward.

What Happens Under the "3 out of 100" Scenario

For a batch of 100 units with **WF = 7,500 L/unit** and **CF = 22 kg CO_2e/unit**:

- **Purchased: 3 units** → 22,500 L water; 66 kg CO_2e
- **Recycled: 30 units** → 225,000 L (already consumed); 660 kg CO_2e
- **Disposed: 67 units** → 502,500 L and 1,474 kg CO_2e *wasted* (product never fulfilled its function)

Total unnecessary externalities for 100 units:
≈ **0.7 million litres of water** and **~2 tonnes of CO_2e**, excluding dye toxicity and microplastics.

Sources

- Ellen MacArthur Foundation ¬ Circular economy, textiles
- UNEP / Global Fashion Agenda ¬ water, chemistry, CO_2 footprints
- Water Footprint Network ¬ cotton/textile water use
- Textile Exchange / Higg / GFA ¬ LCA of materials

2. Energy Intensity and the Cognitive Efficiency of Institutions

Table D.4. Energy-Intensity Calculation with Climate Adjustment

Stage	Formula / Description	Units	Comment
1	$EI_{\text{base}} = \frac{E_{\text{total}}}{GDP_{PPP}}$	kWh per $	Primary energy per PPP-dollar
2	$C_{\text{climate}} = \frac{HDD+CDD}{HDD_{\text{avg}}+CDD_{\text{avg}}}$	dimensionless	Relative heating/cooling demand
3	$EI_{\text{adj}} = \frac{EI_{\text{base}}}{C_{\text{climate}}}$	kWh per $	Climate-corrected intensity
4	$\text{REER}_{\text{norm}}$	dimensionless	Normalised real effective exchange rate
5	$\text{Corr}(\text{EI}_{\text{adj}},\ \text{REER}_{\text{norm}})$	–	Testing hypothesis: efficiency → currency stability

Sources: IEA (2024), Energy Institute (2024), WB GDP PPP (2024), NOAA/ECMWF HDD/CDD (2023), BIS REER Index (2024)

Table D.5. Climate-Adjusted Energy Intensity and Currency Indicators (Demo)

Country	Primary Energy / GDP (kWh/$ PPP)	HDD/CDD	Climate Load	Adjusted EI	REER Index	Comment
Sweden	0.21	4500/150	1.35	0.18	0.82	High efficiency despite cold
Germany	0.25	3200/300	1.10	0.22	0.80	Regulated heat networks
USA	0.31	2800/1200	1.15	0.27	0.77	Consumption > climate need
Japan	0.27	1800/1800	1.20	0.23	0.79	Optimisation across climate zones
Russia	0.75	6200/200	1.60	0.47	0.45	Combined losses + inefficiency
China	0.60	3000/800	1.05	0.57	0.58	Industrial density
India	0.64	200/2000	0.80	0.80	0.52	Hot climate + weak institutions
Singapore	0.33	0/3100	0.85	0.28	0.83	Governance offsets heat
Brazil	0.42	500/2200	0.90	0.37	0.61	Logistics + raw-material losses
UAE	0.90	0/3600	1.00	0.90	0.55	Subsidies mask inefficiency

Conclusions from Table D.5

1. After climate correction, energy intensity differs **4–5×** across countries.
2. Countries with strong institutions (WGI > 80) maintain low energy intensity even in harsh climates.
3. Countries with unstable currencies show anomalously high energy use per GDP-dollar.
4. Correlation of **$r \approx 0.65$** suggests: *cognitive and energy efficiency of institutions is reflected directly in currency stability.*

3. Material Footprint and Human Development: Limits of Rational Wealth

Table D.6. Methodology

Step	Description	Source
1	Material Footprint (MF), tonnes per capita	UNEP IRP 2023
2	Adjustment for resource trade balance	UNEP IRP
3	HDI from UNDP	UNDP HDR 2024
4	Correlation/clusters by WGI	World Bank 2024
5	Visualisation (scatter HDI vs MF)	–

Table D.7. Country Data (2024)

Country	HDI	MF (t/capita)	WGI	Type	Comment
Sweden	0.96	14	94	Institutional	Balanced consumption
Germany	0.94	16	91	Institutional	High recycling
Japan	0.93	13	89	Institutional	Resource-efficient
USA	0.93	29	83	Extractive	Material overshoot
Canada	0.92	31	85	Extractive	Resource-intensive
China	0.77	22	58	Transitional	Growing footprint
Russia	0.82	25	46	Extractive	High footprint
India	0.64	9	54	Transitional	Low MF, low HDI
Brazil	0.76	17	63	Transitional	Institutional lag
UAE	0.90	34	67	Extractive	High material cost of wealth

Conclusions (Tables D.6–D.7)

1. Institutional quality explains up to **60%** of variation between HDI and MF.
2. “Rational wealth” (high HDI, low MF) appears only in **high-trust governance systems**.
3. Market-based wealth (high HDI, high MF) is **energetically and ecologically unsustainable**.
4. Noocratic cognitive economy shifts value from material consumption to *knowledge, design, and feedback*.

4. Waste Recycling and Institutional Maturity

Table D.11. Methodology

Step	Formula / Description	Source
1	$R = \frac{W_{\text{recycled}}}{W_{\text{generated}}} \times 100\%$	OECD 2024
2	$L = \frac{W_{\text{landfilled}}}{W_{\text{generated}}} \times 100\%$	UNEP 2023
3	WGI (6 dimensions)	World Bank
4	Correlation, regression	Author
5	"Opportunity window": R ∈ [20,50], WGI > 55	–

Table D.12. Results (Demo)

Group	Examples	Characteristics
Institutional	Sweden, Germany, Japan	Real closed loops
Transitional	China, UAE, Brazil	Infrastructure improving; culture lagging
Entropic	Russia, India	Landfill-dominant; low transparency

5. Educational Efficiency: Cognitive Return per Dollar

C-ROI (Cognitive Return on Investment) Methodology

Step	Formula	Source
1	$C_i = \frac{PISA_i + PIAAC_i}{2}$	OECD
2	$E_i = E_i^{gov} + E_i^{priv}$	OECD/UNESCO
3	$C\text{-}ROI_i = \frac{C_i}{E_i}$	–
4	If no private data → government only	–
5	Correlate with WGI	World Bank
6	Sensitivity ±10% in private share	–

C-ROI by Country (2024)

Country	PISA (2022)	PIAAC (2023)	Public Expenditure (k$ PPP)	Private Share (%)	Total Expenditure (k$ PPP)	C-ROI (score / k$)	Note
Japan	520	310	9	26	12.2	68	Adjusted (public + private)
South Korea	525	315	8	≈ 45	14.5	58	Adjusted (private data from OECD 2022)
Finland	510	305	10	< 10	11	74	Mainly public financing
Germany	490	300	12	≈ 20	15	53	Partially adjusted
United States	480	295	16	≈ 30	23	34	Adjusted
Russia	480	290	7	< 10	7.5	103	Public expenditure only
China (Shanghai)	560	325	9	≈ 25	12	74	Adjusted estimate
Brazil	410	260	6	≈ 20	7.5	63	Adjusted
India	380	250	5	≈ 15	5.9	64	Adjusted
UAE	440	275	14	≈ 25	18.7	38	Adjusted

Sources: OECD PISA 2022; OECD PIAAC 2023; OECD Education at a Glance 2024; UNESCO UIS; World Bank WGI 2024.

Conclusions

1. After including private spending, C-ROI declines **25–50%** in countries with high paid-education share.
2. Publicly funded systems (Finland, Russia) retain higher C-ROI even at average test scores.
3. Governance quality strongly correlates with C-ROI ($r \approx 0.7$).
4. In Noocracy, C-ROI becomes a core IEKV metric: *how efficiently society converts resources into reason*.

6. Obesity as an Indicator of Overconsumption and Cognitive Incoherence

Table D.17-A. Obesity and Institutional Parameters (Estimate for 2024)

Country	Adult Obesity Rate (%)	HDI	Governance Index (WGI)	Energy Consumption (kWh per capita)	Comment
United States	42	0.92	83	12,000	Market overconsumption; high access to calorie-dense foods
Mexico	36	0.78	63	3,800	Imported consumer pattern; weak nutritional regulation
United Kingdom	29	0.93	86	7,000	Post-industrial abundance and high stress load
Germany	24	0.95	91	6,500	Stable diet structure but overeating in the middle class
Russia	24	0.82	46	5,500	Unbalanced diet + low cognitive health culture
China	16	0.78	58	3,200	Rapid urbanisation and Westernised consumption
South Korea	8	0.92	85	5,600	Culture of moderation; strong public health system
Japan	4	0.94	89	4,900	Cognitive discipline and collective control norms
India	6	0.64	54	1,500	Undernutrition + income inequality
Sweden	14	0.96	94	6,000	Conscious consumption and high physical activity

Sources: WHO Global Health Observatory (2024); World Bank HDI/WGI (2024); IEA Energy Balances (2024).

Conclusions

1. Obesity correlates positively with energy consumption ($r \approx 0.7$).
2. Negative correlation with WGI: strong cognitive institutions → behavioural self-control.
3. Russia and the US show similar obesity rates despite very different institutional structures ¬ common factor: **cognitive deficit in behavioural regulation**.
4. In Noocracy, obesity is read as a *cognitive-physiological symptom of institutional entropy*.

7. Regular Physical Activity as an Indicator of Cognitive Self-Regulation

Table D.18-A. Regular Physical Activity and Institutional Parameters (Estimate for 2024)

Country	Physically Active Adults (%)	WGI Index (0–100)	Obesity (%)	Comment
Sweden	68	94	14	Culture of bodily awareness supported by collective norms
Japan	65	89	4	Cognitive discipline embedded in everyday life
South Korea	60	85	8	Systematic health policy and strong social oversight
Germany	55	91	24	Active lifestyle among the middle class
United States	48	83	42	Symbolic engagement despite high obesity
Russia	35	46	24	Gap between declared and actual behaviour
China	40	58	16	State activity programmes but low self-regulation
India	25	54	6	Limited access to sports infrastructure
Brazil	30	63	22	Unstable infrastructure and social barriers
UAE	28	67	20	Climatic constraints and cultural factors

Sources: WHO Global Health Observatory (2024); OECD *Better Life Index* (2024); World Bank WGI (2024).

Table D.18-B. Correlations and Summary Indicators

Parameter	Correlation Coefficient (r)	Direction of Relationship
Physical activity ↔ WGI	**+0.65**	Higher governance quality corresponds to higher physical activity
Physical activity ↔ obesity	**−0.70**	Physical activity reduces entropic costs (lower obesity rates)
WGI ↔ obesity	**−0.75**	Strong institutions correspond to systemic self-regulation

Conclusions

1. Physical activity reflects cognitive equilibrium: bodily self-regulation parallels social self-regulation.
2. Negative correlation with obesity shows activity reduces entropic consumption.
3. Scandinavia and East Asia exhibit collective self-regulation.

4. Russia and the USA show “cognitive dispersion”: high awareness, low actual engagement.
5. In noocratic terms, activity is *the cognitive respiration of society*: it expels accumulated entropy.

8. Case Study: Sutskever vs Altman ¬ Cognitive Ideal vs Power Architecture

In 2024, a leading AI researcher entered a public confrontation with the corporate executive he worked under. Formally, the dispute concerned adherence to charter procedures and the mission "to benefit humanity."

In reality, the conflict between **Ilya Sutskever** and **Sam Altman** became an almost laboratory demonstration of the clash between **two rationalities**:

- **cognitive rationality** ("reason as honesty") ¬ literalism, mission, procedure;
- **political rationality** ("reason as power") ¬ managing attention, teams, capital.

In noocratic terms, this represents a **CEC-loop failure**: operational rationality dominating cognitive-ethical rationality.
The system rewarded not the reduction of knowledge entropy, but the manipulation of trust and capital.

Sutskever's trajectory echoes archetypes like Turing, Vavilov, and Tesla ¬ individuals defeated by politics yet leaving behind tools their political contemporaries could not fully understand.

This conflict is not a tragedy of personalities but a **symptom of systemic illness**:
modern institutions still reward mastery over attention rather than mastery over truth.

When the architect of knowledge acts by the rules and the architect of power acts by interest, the outcome is predictable: *power wins*, because the structure lacks a cognitive feedback contour.

The belief that humanity is "saved" because knowledge remains with the defeated is an illusion. Eventually, someone will combine *power* and *algorithm*.

Avoiding this requires not the morality of individuals but an **institutional guarantee** that no decision can be made without passing a cognitive-ethical audit.

This is the essence of Noocracy:
to ensure that the world no longer depends on who happens to be more honest, but that **honesty itself becomes part of the architecture of reason**.