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NET ZERO NAVIGATOR

**The High Cost of Low Prices:
Roadmap to Sustainable Supply Chains**
Presentation to ISE

May 4, 2022

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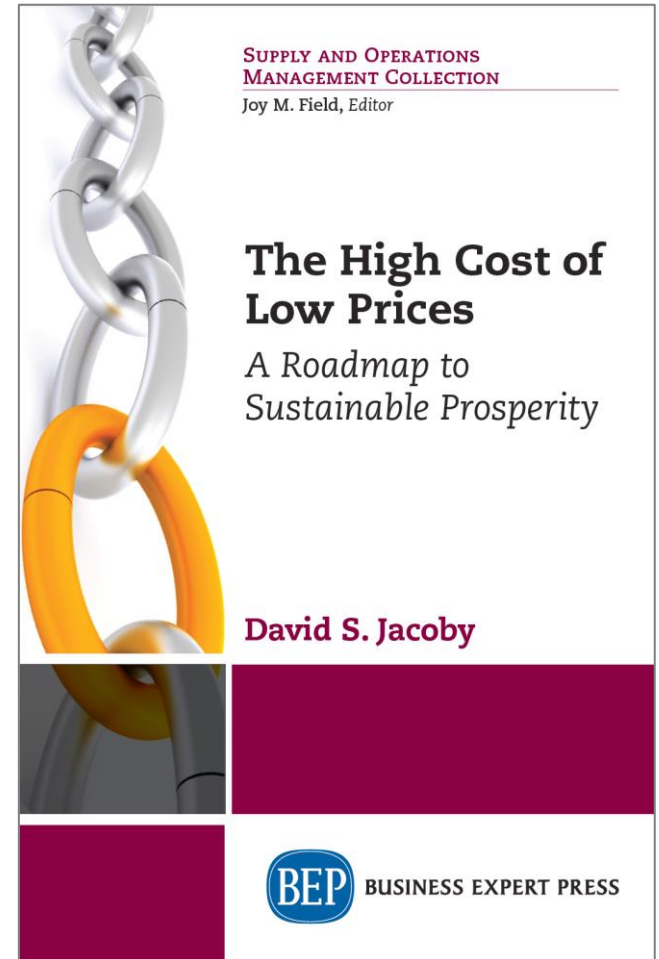
SNAPSHOTS OF MODERN DEVELOPMENT

- Resource Depletion
 - Abuja, Nigeria, 2012
 - London, England, 2010
- Ecology
 - Ras Laffan, Qatar, 2010
 - Jubail, Saudi Arabia, 2017
- Society
 - Lagos, Nigeria, 2012
 - Bogotá, Colombia, 2015



WHAT IS GOING ON?

- Comfort and Convenience
- Consumption Patterns and Consumerism
- Construction, Development, and Power
- Dirty (and Wasteful) Manufacturing Processes
- Using Energy to Make Energy
- Careless Management of Toxic Chemicals and Waste Disposal
- Businesses Aggressively Catering to Consumer Wants





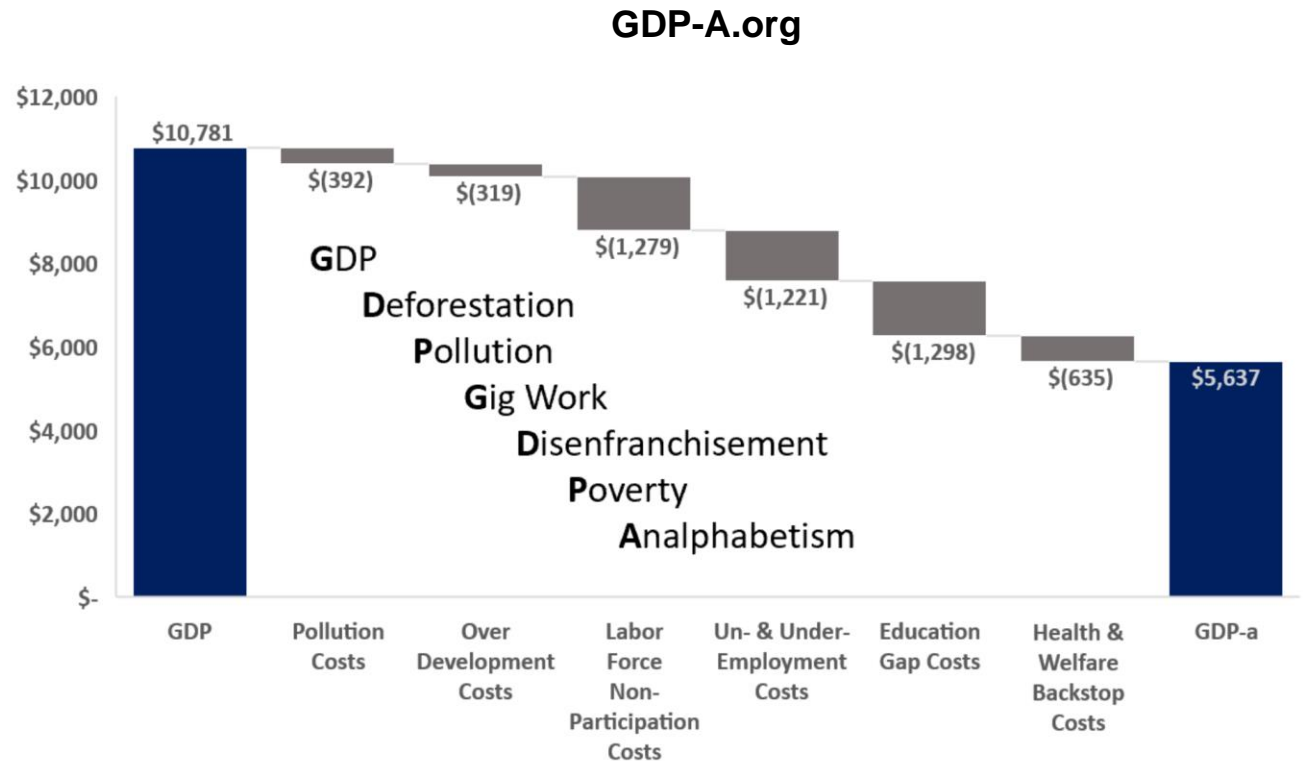
EVERYDAY LOW PRICES





THE BASELINE PATH

- Extinction
- Overpopulation
- Consumerism
- Industrialization
- Air pollution





A BOTTLE OF WATER: CLEAR WITH A TRAIL OF BLACK

D-Factor for a Bottle of Water: 1.4

Major Cost	SubCost	NAICS Classification	Cost Structure Percentage	Cost (USD)	Country	Depletion	Devastation	Dehumanization	D-Factor
Grocery Store									
Labor	Retail Sales	General Merchandise Stores	5%	\$ 0.06	USA	0.045	0.023	0.004	0.072
	Management	General Merchandise Stores	1%	\$ 0.01	USA	0.009	0.005	0.001	0.014
Capital	Facility Overhead	General Merchandise Stores	4%	\$ 0.05	USA	0.036	0.018	0.003	0.058
	Total		10%	\$ 0.12					0.144
Transportation and Distribution									
Labor	Driver 1	Truck Transportation	6%	\$ 0.07	Japan	0.029	0.024	0.004	0.057
	Warehousing	Warehousing and Storage	5%	\$ 0.06	Japan	0.022	0.018	0.003	0.043
	Driver 2	Truck Transportation	3%	\$ 0.04	Japan	0.014	0.012	0.002	0.029
Capital	Ships and Trucks	Truck Transportation	10%	\$ 0.12	USA	0.091	0.046	0.007	0.144
	Warehouse	Warehousing and Storage	6%	\$ 0.07	USA	0.056	0.029	0.004	0.089
	Total		31%	\$ 0.36					0.362
Bottle Manufacturing and Bottling									
Labor	Plant Labor	Beverage and Tobacco Product Manufacturing	3%	\$ 0.03	China	0.010	0.020	0.010	0.040
	Management	Beverage and Tobacco Product Manufacturing	1%	\$ 0.02	China	0.005	0.010	0.005	0.020
Manufacturin	Bottle Blowing	Beverage and Tobacco Product Manufacturing	6%	\$ 0.08	China	0.024	0.051	0.025	0.100
	Bottle washing, filling, & capping	Beverage and Tobacco Product Manufacturing	4%	\$ 0.05	China	0.015	0.030	0.015	0.060
	Drying	Beverage and Tobacco Product Manufacturing	3%	\$ 0.03	China	0.010	0.020	0.010	0.040
	Labeling & printing	Printing and Related Support Activities	4%	\$ 0.05	China	0.015	0.030	0.015	0.060
	PE Film Packaging	Plastics and Rubber Products Manufacturing	5%	\$ 0.06	China	0.019	0.040	0.020	0.080
	Total		25%	\$ 0.30					0.399
Chemical Processing (for Bottles)									
Labor	Plant Labor	Chemical Manufacturing	1%	\$ 0.02	China	0.005	0.010	0.005	0.020
	Management	Chemical Manufacturing	1%	\$ 0.01	China	0.002	0.005	0.002	0.010
Chemical Proc	Chemicals: Polyethylene Terephthalate (PET) and Ethylene Glycol (EG)	Chemical Manufacturing	6%	\$ 0.08	China	0.024	0.051	0.025	0.100
	Esterification	Chemical Manufacturing	1%	\$ 0.02	China	0.006	0.012	0.006	0.023
	Pre-polymerization	Chemical Manufacturing	1%	\$ 0.02	China	0.006	0.012	0.006	0.023
	Polymerization	Chemical Manufacturing	1%	\$ 0.02	China	0.006	0.012	0.006	0.023
	Total		13%	\$ 0.15					0.199
Water Processing									
Labor	Plant Labor	Beverage and Tobacco Product Manufacturing	2%	\$ 0.02	Thailand	0.005	0.012	0.005	0.023
	Management	Beverage and Tobacco Product Manufacturing	1%	\$ 0.01	Thailand	0.002	0.006	0.003	0.011
Processing Op	Quartz Sand Filtration	Machinery Manufacturing	3%	\$ 0.04	Thailand	0.008	0.020	0.009	0.038
	Active Carbon Filtration	Machinery Manufacturing	3%	\$ 0.04	Thailand	0.008	0.020	0.009	0.038
	Reverse Osmosis or Ultrafiltration	Machinery Manufacturing	2%	\$ 0.02	Thailand	0.006	0.014	0.006	0.026
	Mineralization	Machinery Manufacturing	3%	\$ 0.04	Thailand	0.008	0.020	0.009	0.038
	Sterilization	Machinery Manufacturing	3%	\$ 0.04	Thailand	0.008	0.020	0.009	0.038
	Total		18%	\$ 0.20					0.213
	Extraction								
Labor	Water extraction system maintenance	Beverage and Tobacco Product Manufacturing	0.6%	\$ 0.01	Indonesia	0.002	0.004	0.002	0.009
	Crude oil extraction	Mining	0.0%	\$ 0.00	Indonesia	0.000	0.000	0.000	0.000
Equipment	Water pumps & Piping	Beverage and Tobacco Product Manufacturing	2.2%	\$ 0.03	Indonesia	0.009	0.018	0.009	0.035
	Exploration	Mining	0.0%	\$ -	Indonesia	-	-	-	-
	Drilling & Completion	Mining	0.3%	\$ 0.00	Indonesia	0.001	0.003	0.001	0.005
	Production	Mining	1.1%	\$ 0.01	Indonesia	0.004	0.009	0.004	0.017
	Transportation (pipeline to processing)	Pipeline Transportation	1.1%	\$ 0.01	Indonesia	0.004	0.009	0.004	0.017
	Total		11%	\$ 0.06					0.083
SUMMATION OF DIRECT AND INDIRECT IMPACTS									
Labor	Equipment & Facilities			0.35		0.151	0.150	0.046	0.348
				0.85		0.365	0.485	0.204	1.053
Total (D-Factor)						0.52	0.63	0.25	1.40
D-Factor per \$						37%	45%	18%	1.17
Cost of a bottle of water			\$	1.20					

Source: Jacoby, David Steven. The High Cost of Low Prices: A Roadmap to Sustainable Prosperity. Business Expert Press, 2017.



A CUP OF COFFEE: WAKING UP TO THE CONSEQUENCES

D-Factor for a Cup of Coffee 2.0

Major Cost	SubCost	NAICS Classification	Cost Structure Percentage	Cost (USD)	Country	Depletion	Devastation	Dehumanization	D-Factor
Retail									
Labor	Retail Sales	Food and Beverage Stores	2.5%	\$ 0.05	Canada	0.05	0.02	0.02	0.09
	Management	Food and Beverage Stores	0.5%	\$ 0.01	Canada	0.01	0.00	0.00	0.02
Capital	Facility Overhead	Food and Beverage Stores	5.1%	\$ 0.11	Canada	0.11	0.03	0.03	0.17
	Total		8.1%	\$ 0.17		-	-	-	0.28
Transportation									
Labor	Truck Drivers	Truck Transportation	0.3%	\$ 0.01	Canada	0.01	0.00	0.00	0.01
Capital	Trucks (warehouse to retail)	Truck Transportation	1.3%	\$ 0.03	Canada	0.03	0.01	0.01	0.05
	Total		1.7%	\$ 0.04		-	-	-	0.06
Roasting/packaging									
Labor	Machine operators	Beverage and Tobacco Product Manufacturing	8.5%	\$ 0.18	Mexico	0.05	0.10	0.10	0.24
	Management	Beverage and Tobacco Product Manufacturing	6.1%	\$ 0.13	Mexico	0.03	0.07	0.07	0.17
Capital	Roasting Machinery	Beverage and Tobacco Product Manufacturing	24.4%	\$ 0.51	Mexico	0.13	0.27	0.27	0.67
	Packaging Machinery	Beverage and Tobacco Product Manufacturing	7.3%	\$ 0.15	Mexico	0.04	0.08	0.08	0.20
	Packaging	Beverage and Tobacco Product Manufacturing	2.4%	\$ 0.05	Mexico	0.01	0.03	0.03	0.07
	Total		48.8%	\$ 1.03		-	-	-	1.35
Transportation									
Labor	Ship Crew	Water Transportation	0.7%	\$ 0.01	Mexico	0.00	0.01	0.01	0.02
	Truck Drivers	Truck Transportation	0.5%	\$ 0.01	Mexico	0.00	0.01	0.01	0.01
	Container Ship Colombia to US	Water Transportation	1.0%	\$ 0.02	Liberia	0.00	0.02	0.02	0.04
Capital	Truck from Port to Roaster	Truck Transportation	0.7%	\$ 0.01	USA	0.01	0.01	0.01	0.02
	Truck from Roaster to Warehouse	Truck Transportation	0.5%	\$ 0.01	USA	0.01	0.00	0.00	0.02
	Total		3.4%	\$ 0.07		-	-	-	0.11
Milling									
Labor	Machine Operators	Food Manufacturing	1.2%	\$ 0.02	Mexico	0.01	0.01	0.01	0.03
	Management	Food Manufacturing	0.9%	\$ 0.02	Mexico	0.00	0.01	0.01	0.02
Capital	Milling Machinery	Food Manufacturing	3.2%	\$ 0.07	Mexico	0.02	0.04	0.04	0.09
	Packaging Machinery	Food Manufacturing	0.6%	\$ 0.01	Mexico	0.00	0.01	0.01	0.02
	Total		5.9%	\$ 0.12		-	-	-	0.16
Transportation									
Labor	Truck Drivers	Truck Transportation	0.2%	\$ 0.00	Colombia	0.00	0.00	0.00	0.00
Equipment	Trucks (Farm to Mill)	Truck Transportation	0.7%	\$ 0.01	Colombia	0.00	0.01	0.01	0.02
	Total		0.8%	\$ 0.02		-	-	-	0.02
Cultivation									
Labor	Cultivation	Agriculture, Forestry, Fishing and Hunting	10.6%	\$ 0.22	Colombia	0.04	0.13	0.13	0.30
	Harvesting	Agriculture, Forestry, Fishing and Hunting	2.6%	\$ 0.06	Colombia	0.01	0.03	0.03	0.07
Land, machinery, and	Machinery and land rent	Agriculture, Forestry, Fishing and Hunting	2.8%	\$ 0.06	Colombia	0.01	0.03	0.03	0.08
	Utility and fuel	Utilities	2.5%	\$ 0.05	Colombia	0.01	0.03	0.03	0.07
	Fertilizer and chemicals	Chemical Manufacturing	4.3%	\$ 0.09	Colombia	0.02	0.05	0.05	0.12
	Maintenance	Agriculture, Forestry, Fishing and Hunting	2.5%	\$ 0.05	Colombia	0.01	0.03	0.03	0.07
	Interest	Services	1.8%	\$ 0.04	Colombia	0.01	0.02	0.02	0.05
	Taxes	Services	1.2%	\$ 0.02	Colombia	0.00	0.01	0.01	0.03
	All other	Agriculture, Forestry, Fishing and Hunting	3.1%	\$ 0.06	Colombia	0.01	0.04	0.04	0.09
	Total		31.3%	\$ 0.66		-	-	-	0.88
SUMMATION OF DIRECT AND INDIRECT IMPACTS									
Labor			0.36	0.75		0.22	0.40	0.40	1.03
Components, Equipment & Facilities			0.64	1.35		0.42	0.71	0.71	1.83
	Total (D-Factor)		1.00	2.10		0.42	0.71	0.71	1.83
	D-Factor per \$					23%	39%	39%	0.87
Cost of a cup of Coffee				\$ 2.10					

Source: Jacoby, David Steven. The High Cost of Low Prices: A Roadmap to Sustainable Prosperity. Business Expert Press, 2017.



A TANK OF GASOLINE: DRIVING THE LAST MILE

D-Factor for a Tank of Fuel: 89

Major Cost	SubCost	NAICS Classification	Cost Structure	Cost (USD)	Country	Degleation	Devasiation	Dehumanization	D-Factor
Gas Station	Retail Sales	Gasoline Stations		2.3%	France	0.265	0.337	0.074	0.676
	Management	Gasoline Stations		0.5%	France	0.053	0.067	0.015	0.135
	Capital	Facility Overhead	Gasoline Stations	1.8%	France	0.212	0.270	0.059	0.541
		Total		4.5%					1.351
Transport to Gas Station (Tanker Truck)	Labor	Truck Driver	Truck Transportation	0.6%	France	0.071	0.090	0.020	0.180
		Company Management	Truck Transportation	0.2%	France	0.024	0.030	0.007	0.060
	Equipment an	Truck	Truck Transportation	0.8%	France	0.094	0.120	0.026	0.240
		Fuel	Petroleum and Coal Products Manufacturing	0.4%	France	0.047	0.060	0.013	0.120
	Total		2.0%					0.601	
Storage Terminal	Labor	Maintenance personnel	Pipeline Transportation	0.8%	Belgium	0.151	0.130	0.020	0.300
		Company Management	Pipeline Transportation	0.4%	Belgium	0.080	0.069	0.011	0.160
	Capital	Tanks	Fabricated Metal Product Manufacturing	1.3%	Belgium	0.251	0.216	0.033	0.501
		Piping	Fabricated Metal Product Manufacturing	0.5%	Belgium	0.100	0.086	0.013	0.200
		Pumps	Electrical Equipment, Appliance, and Component Manufacturing	1.0%	Belgium	0.201	0.173	0.027	0.400
		Power	Utilities	1.1%	Belgium	0.211	0.182	0.028	0.421
	Total		5.0%					1.982	
Transport to Storage Terminal (pipeline)	Labor	Maintenance personnel	Pipeline Transportation	0.2%	Netherlands	0.033	0.017	0.001	0.053
		Company Management	Pipeline Transportation	0.1%	Netherlands	0.017	0.009	0.001	0.026
	Equipment an	Line Pipe	Fabricated Metal Product Manufacturing	0.4%	Netherlands	0.083	0.043	0.003	0.129
		Pumps	Electrical Equipment, Appliance, and Component Manufacturing	0.2%	Netherlands	0.050	0.026	0.002	0.077
		Pigging Equipment	Electrical Equipment, Appliance, and Component Manufacturing	0.2%	Netherlands	0.033	0.017	0.001	0.052
		Monitoring Equipment	Computer and Electronic Product Manufacturing	0.2%	Netherlands	0.050	0.026	0.002	0.077
	Power	Utilities	0.3%	Netherlands	0.067	0.035	0.002	0.103	
	Total		1.5%					0.517	
Refining	Labor	Refinery Operations and Maintenance Personnel	Petroleum and Coal Products Manufacturing	2.4%	Germany	0.423	0.242	0.052	0.728
		Refinery Supervision	Petroleum and Coal Products Manufacturing	0.8%	Germany	0.144	0.081	0.017	0.243
		Company Management	Petroleum and Coal Products Manufacturing	0.4%	Germany	0.072	0.040	0.009	0.121
	Capital	Utilities (Capital Cost)	Utilities	1.6%	Germany	0.289	0.162	0.034	0.485
		Civil Works	Construction	0.8%	Germany	0.144	0.081	0.017	0.243
		Process Units	Petroleum and Coal Products Manufacturing	6.4%	Germany	1.156	0.647	0.137	1.941
		Piping and Scaffolding	Fabricated Metal Product Manufacturing	0.8%	Philippines	0.023	0.232	0.091	0.345
		Import/Export Facilities	Pipeline Transportation	0.8%	Germany	0.144	0.081	0.017	0.243
		Fuel	Petroleum and Coal Products Manufacturing	1.6%	Russia	0.452	0.386	0.199	1.036
		Catalysts & Chemicals	Chemical Manufacturing	0.4%	Germany	0.072	0.040	0.009	0.121
		Total		16.0%		7.00			5.506
	Transportation to refinery (Pipeline)	Labor	Maintenance Personnel	Pipeline Transportation	0.5%	Turkey	0.047	0.117	0.056
		Company Management	Pipeline Transportation	0.3%	Turkey	0.023	0.058	0.028	0.110
Equipment an		Line Pipe	Fabricated Metal Product Manufacturing	1.3%	Turkey	0.117	0.292	0.140	0.549
		Pumps	Electrical Equipment, Appliance, and Component Manufacturing	0.8%	Turkey	0.070	0.175	0.084	0.310
		Pigging Equipment	Electrical Equipment, Appliance, and Component Manufacturing	0.5%	Turkey	0.047	0.117	0.056	0.220
		Monitoring Equipment	Computer and Electronic Product Manufacturing	0.8%	Turkey	0.070	0.175	0.084	0.310
	Power	Utilities	1.0%	Turkey	0.094	0.233	0.112	0.439	
	Total		5.0%		2.19			2.197	
Production	Labor	Field Maintenance (MRO personnel)	Mining	3.4%	Pakistan	0.114	1.143	0.050	1.307
		Field Management (Specialists)	Mining	1.5%	Saudi Arabia	0.493	0.259	0.181	0.933
		Company Management	Mining	0.4%	Saudi Arabia	0.123	0.065	0.045	0.233
	Equipment an	Onsite Tree	Fabricated Metal Product Manufacturing	0.8%	Saudi Arabia	0.246	0.129	0.091	0.467
		Chemicals	Chemical Manufacturing	3.0%	USA	0.993	0.505	0.079	1.577
		Workover Consumables	Machinery Manufacturing	3.0%	USA	0.993	0.505	0.079	1.577
	Pumps	Electrical Equipment, Appliance, and Component Manufacturing	3.0%	USA	0.993	0.505	0.079	1.577	
	Total		15.0%		6.57			7.670	
Drilling	Labor	Roughnecks	Mining	4.5%	Kuwait	4.861	0.840	0.421	6.122
		Rig Specialists	Mining	6.8%	Kuwait	7.291	1.260	0.631	9.183
		Company Management	Mining	1.1%	Kuwait	1.215	0.210	0.105	1.530
		Site Preparation Labor	Construction	0.9%	Kuwait	0.972	0.168	0.084	1.224
	Equipment an	Rig (Including BOP and Wellhead)	Machinery Manufacturing	9.0%	Kuwait	9.722	1.681	0.841	12.244
		Drilling consumables	Machinery Manufacturing	12.4%	Kuwait	13.368	2.311	1.157	16.835
		(Bits, OCTG, Chemicals, Downhole Tools)							
		Mud	Chemical Manufacturing	4.5%	Kuwait	4.861	0.840	0.421	6.122
		Cement	Construction	3.6%	Kuwait	3.889	0.672	0.337	4.898
		Site Preparation Machinery	Machinery Manufacturing	2.3%	Kuwait	2.450	0.420	0.210	3.061
	Total		45.0%		19.70			61.219	
Exploration	Labor	Geologists	Mining	0.6%	Kuwait	0.648	0.112	0.056	0.816
		Machinery Operators (Seismographs, etc.)	Mining	0.5%	Kuwait	0.486	0.084	0.042	0.612
		Exploration Crew	Mining	0.4%	Kuwait	0.434	0.075	0.038	0.547
		Company Management	Mining	0.2%	Kuwait	0.214	0.037	0.019	0.269
	Equipment an	Imaging Equipment	Computer and Electronic Product Manufacturing	0.9%	Kuwait	0.972	0.168	0.084	1.224
		Exploration Rig (Trucks)	Machinery Manufacturing	1.5%	Kuwait	1.620	0.280	0.140	2.041
	Fuel	Petroleum and Coal Products Manufacturing	1.2%	Kuwait	1.296	0.224	0.112	1.633	
	Lab Analysis Equipment	Computer and Electronic Product Manufacturing	0.8%	Kuwait	0.810	0.140	0.070	1.020	
	Total		6.0%		2.63			3.613	
SUMMATION OF DIRECT AND INDIRECT IMPACTS									
Labor				29%	12.87	18.27	5.54	1.98	25.79
Equipment & Facilities				71%	30.88	46.27	12.25	4.89	63.42
Total (D-Factor)					64.54	17.80	6.87	89.21	
D-Factor per \$						72%	20%	8%	2.04
Cost of a tank of fuel	\$		43.77	\$	0.61	18.00	gallons per tank		

Source: Jacoby, David Steven. The High Cost of Low Prices: A Roadmap to Sustainable Prosperity. Business Expert Press, 2017.



AN iPad: SMALL COMPONENTS WITH A GLOBAL FOOTPRINT

D-Factor for an iPad: 630

Major Cost	SubCost	NAICS Classification	Cost Structure			Depletion	Devastation	Dehuman-ization	D-Factor	
			Percentage	Cost (USD)	Country					
Retail Store										
Labor	Retail Sales	Electronics and Appliance Stores	1.05%	\$ 5.63	USA	4.3	2.2	0.3	6.76	
	Management	Electronics and Appliance Stores	0.35%	\$ 1.88	USA	1.4	0.7	0.1	2.25	
Capital	Facility Overhead	Electronics and Appliance Stores	2.11%	\$ 11.25	USA	8.5	4.3	0.7	13.51	
	Total		3.52%	\$ 18.76					22.52	
Transport, Logistics, & Distribution										
Labor	Ship Crew	Water Transportation	0.07%	\$ 0.36	China	0.1	0.2	0.1	0.48	
	Truck Drivers	Truck Transportation	0.06%	\$ 0.30	USA	0.2	0.1	0.0	0.36	
Equipment	Container ship China to US	Water Transportation	0.27%	\$ 1.44	China	0.5	1.0	0.5	1.91	
	Truck from Port to Warehouse	Truck Transportation	0.12%	\$ 0.66	USA	0.5	0.3	0.0	-	
	Truck from Warehouse to Retail Outlet	Truck Transportation	0.04%	\$ 0.24	USA	0.2	0.1	0.0	-	
Total			0.56%	\$ 3.00					2.75	
Manufacturing & Assembly										
Labor	Assembly	Electrical Equipment, Appliance, and Component Manufacturing	1.35%	\$ 7.20	China	2.3	4.9	2.4	9.58	
	Plant Supervision	Electrical Equipment, Appliance, and Component Manufacturing	0.40%	\$ 2.15	China	0.7	1.4	0.7	2.86	
	Company Management	Electrical Equipment, Appliance, and Component Manufacturing	0.26%	\$ 1.40	USA	1.1	0.5	0.1	1.68	
Components	Memory	Electrical Equipment, Appliance, and Component Manufacturing	8.91%	\$ 47.50	Japan	18.5	15.5	2.6	36.58	
	Display	Electrical Equipment, Appliance, and Component Manufacturing	16.31%	\$ 87.00	South Korea	47.0	37.3	10.0	94.32	
	Touchscreen	Electrical Equipment, Appliance, and Component Manufacturing	7.50%	\$ 40.00	China	12.9	27.0	13.3	53.19	
	Processor	Electrical Equipment, Appliance, and Component Manufacturing	4.31%	\$ 23.00	South Korea	12.4	9.9	2.6	24.93	
	Camera	Electrical Equipment, Appliance, and Component Manufacturing	2.32%	\$ 12.35	Japan	4.8	4.0	0.7	9.51	
	Wireless Module	Electrical Equipment, Appliance, and Component Manufacturing	7.78%	\$ 41.50	India	3.9	33.8	16.8	54.53	
	User Interface and Sensors	Electrical Equipment, Appliance, and Component Manufacturing	2.81%	\$ 15.00	South Korea	8.1	6.4	1.7	16.26	
	Power Management	Electrical Equipment, Appliance, and Component Manufacturing	1.87%	\$ 10.00	India	0.9	8.1	4.1	13.14	
	Battery	Electrical Equipment, Appliance, and Component Manufacturing	6.00%	\$ 32.00	South Korea	17.3	13.7	3.7	34.69	
	Electromechanical Systems	Electrical Equipment, Appliance, and Component Manufacturing	9.47%	\$ 50.50	USA	38.2	19.4	3.0	60.64	
	Accessories	Electrical Equipment, Appliance, and Component Manufacturing	1.03%	\$ 5.50	China	1.8	3.7	1.8	7.31	
	Total			70.32%	\$ 375.10					419.23
Extraction										
Labor	Mining	Mining	2.46%	\$ 13.13	China	4.2	8.9	4.4	17.46	
	Logging	Agriculture, Forestry, Fishing and Hunting	1.48%	\$ 7.88	China	2.5	5.3	2.6	10.48	
	Extraction Supervision	Mining	0.74%	\$ 3.94	China	1.3	2.7	1.3	5.24	
	Mangement (overhead)	Mining	0.25%	\$ 1.31	China	0.4	0.9	0.4	1.75	
Materials	Silica (for circuit boards and glass) - 355g	Mining	2.46%	\$ 13.13	China	4.2	8.9	4.4	17.46	
	Bauxite (for Aluminum) - 125g	Mining	5.91%	\$ 31.51	Australia	38.3	6.6	0.6	45.50	
	Crude Oil (for plastics used in Ipad and packaging) - 135g	Mining	3.45%	\$ 18.38	China	5.9	12.4	6.1	24.44	
	Lithium Oxides (for battery) - 155g	Mining	2.95%	\$ 15.75	China	5.1	10.6	5.2	20.95	
	Rare Earth Oxides (used in the battery and electronics) - 5g	Mining	4.92%	\$ 26.26	China	8.5	17.7	8.7	34.92	
	Paper (used in packaging) - 631g	Agriculture, Forestry, Fishing and Hunting	0.98%	\$ 5.25	China	1.7	3.5	1.7	6.98	
	Total			25.60%	\$ 136.54					185.17
	SUMMATION OF DIRECT AND INDIRECT IMPACTS									
Labor			8.47%	45.17		18.16	26.90	12.07	58.88	
Components, Equipment & Facilities			91.53%	488.22		239.82	245.02	88.78	570.79	
Total (D-Factor)			100.00%	533.39		257.98	271.92	100.85	629.67	
D-Factor per \$						41%	43%	16%	0.90	
Cost of an iPad				\$699						

Source: Jacoby, David Steven. The High Cost of Low Prices: A Roadmap to Sustainable Prosperity. Business Expert Press, 2017.



A FLIGHT: ABOVE THE O-ZONE

D-Factor for a Transatlantic Flight: 2,023

Major Cost	SubCost	NAICS Classification	Cost Structu	Cost (USD)	Country	Depletion	Devastation	Dehumanization	D-Factor
Retail and Marketing									
Labor	Admin	Nonstore Retailers	7.0%	\$ 98.00	United Kingdom	34.57	26.26	3.43	64.25
	Management	Nonstore Retailers	1.0%	\$ 14.00	United Kingdom	4.94	3.75	0.49	9.18
	IT	Services	3.5%	\$ 49.00	United Kingdom	17.28	13.13	1.71	32.13
Facility Overh	Office	Nonstore Retailers	5.0%	\$ 70.00	United Kingdom	24.69	18.76	2.45	45.90
	IT Infrastructure	Computer and Electronic Product Manufacturing	5.0%	\$ 70.00	United Kingdom	24.69	18.76	2.45	45.90
	Total		21.5%	\$ 301.00					197.35
Aircraft Operations									
Labor	Pilot	Air Transportation	7.0%	\$ 98.00	United Kingdom	34.57	26.26	3.43	64.25
	Flight Attendants	Air Transportation	10.0%	\$ 140.00	United Kingdom	49.38	37.51	4.89	91.79
Equipment an	Aircraft	Air Transportation	0.5%	\$ 7.00	USA	5.29	2.69	0.42	8.41
	Maintenance	Air Transportation	10.0%	\$ 140.00	Brazil	52.31	77.89	26.84	157.04
	Total		27.5%	\$ 385.00					321.49
Fuel									
Labor	Truck Driver	Truck Transportation		\$ -	Kuwait	-	-	-	-
	Company Management	Truck Transportation		\$ -	Kuwait	-	-	-	-
Equipment an	Truck	Truck Transportation		\$ -	Kuwait	-	-	-	-
	Fuel	Petroleum and Coal Products Manufacturing	28.2%	\$ 394.80	Kuwait	974.33	168.42	84.32	1,227.06
	Total		28.2%	\$ 394.80					1,227.06
Ground Operations									
Labor	Truck Driver	Truck Transportation	7.0%	\$ 98.00	USA	74.12	37.66	5.90	117.67
	Company Management	Truck Transportation		\$ -	USA	-	-	-	-
Equipment an	Truck	Truck Transportation	1.0%	\$ 14.00	USA	10.59	5.38	0.84	16.81
	Fuel	Petroleum and Coal Products Manufacturing		\$ -	USA	-	-	-	-
	Total		8.0%	\$ 112.00					134.48
Fixed Costs									
Labor	Truck Driver	Truck Transportation	7.0%	\$ 98.00	United Kingdom	34.57	26.26	3.43	64.25
	Company Management	Truck Transportation	6.8%	\$ 95.20	United Kingdom	33.58	25.51	3.33	62.42
Equipment an	Truck	Truck Transportation	1.0%	\$ 14.00	USA	10.59	5.38	0.84	16.81
	Fuel	Petroleum and Coal Products Manufacturing		\$ -	USA	-	-	-	-
	Total		14.8%	\$ 207.20					143.48
SUMMATION OF DIRECT AND INDIRECT IMPACTS									
Labor			49%	\$ 690.20		\$ 283.01	\$ 196.34	\$ 26.60	505.95
Equipment & Facilities			51%	709.80		1,102.49	297.27	118.16	1,517.92
Total (D-Factor)						1,385.50	493.61	144.76	2,023.87
D-Factor per \$						68%	24%	7%	1.45
Cost of an airplane ticket		\$	1,400						

Source: Jacoby, David Steven. The High Cost of Low Prices: A Roadmap to Sustainable Prosperity. Business Expert Press, 2017.

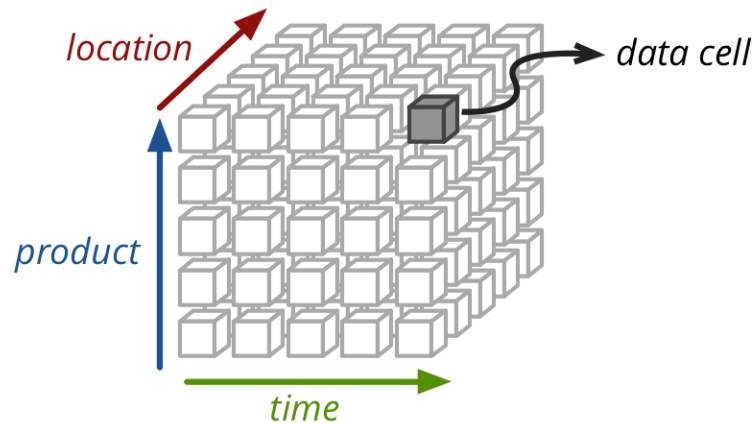


WHAT ISE MIGHT DO: USE AI TO BUILD A GLOBAL DATABANK OF SUPPLY CHAIN SUSTAINABILITY BY PRODUCT FAMILY AND BRAND

- Sustainability scores and graduated color coding from green to red
- Takes into account ecological, environmental, and social factors

Supply Chain Sustainability Rating		
LY Solar Panel 41144 - 12-volt 5-watt Amorphous Silicon Solar Module		
E	\$	0.18
S	\$	0.32
G	\$	0.32
Σ	\$	0.82
vs. Good	\$	1.00

Supply Chain Sustainability Rating		
iPhone 12 Pro Max		
E	\$	0.30
S	\$	0.53
G	\$	0.53
Σ	\$	1.36
vs. Good	\$	1.00





Regional Approaches

- The European Model
- The American Model
- Asian Approaches
- African And Middle Eastern Approaches



ROADMAP FOR THE FUTURE: THE AGENDA FOR CHANGE

- Voluntary Behavior Change
- Three Easy (but Unpalatable) Solutions
 - Shift the international supply chain to countries that have lower D-Factors. The result would be more expensive goods.
 - Localize supply chains.
 - Eliminate the supply chain altogether by reducing consumption, either by changes in behavior and values, or by limiting population growth.

Recommendations

- Tax Carbon at the Source
- Mandate Clean Power
- Mandate Clean Fuel
- Mandate 100% Recyclable Consumer Products
- Mandate Reporting into the UN Global Compact
- Institute a Balanced Scorecard of Progressively Tightening Key Performance Indicators
- Develop Human Zoning Principles, Benchmarks, and Standards
- Put a Label On It
- Report GPI instead of GDP



SUSTAINABLE SUPPLY CHAIN PRACTICES

- Long-term supply agreements - WalMart
- Closed-loop supply chains with "extended product responsibility" for reverse logistics – Nike (returning sneakers)
- End-of-Life Planning & “Design for Disassembly” - EU
- Design for Reverse Logistics programs - HP, Kodak
- Nested packaging – Ford floorboards
- Using recycled packaging can reduce the cost of packaging - Dell and Walmart
- Requiring suppliers to abide by sustainability principles and practices – Alcatel strategic sourcing



ALL STAKEHOLDERS HAVE A ROLE TO PLAY

- Non-governmental organizations (NGOs): adopt, endorse, and/or refine these recommendations
- Regional, national, and local regulatory agencies, governmental bodies, and lenders should refine and adapt the recommendations to local circumstances, and set up pilot programs.
- Independent specialists including consulting and accounting firms as well as technical experts and engineers, should measure, report on, and compare the Key Performance Indicators.

The stakes are high and the effort is large, but the human capacity and talent to adapt is larger, and the future can be clean and bright for all.