Appendix A.

Table A1: Impact Assessment Results for Textile Industry Supply Chain - Impact Category EF3.0

Name	**Category**	**Impact assessment result**	**Unit**
Acidification	EF 3.0 Method	15.60210372	mol H+ eq
Climate change	EF 3.0 Method	3213.287615	kg CO^2 eq
Climate change - Biogenic	EF 3.0 Method	0.678749288	kg CO^2 eq
Climate change - Fossil	EF 3.0 Method	3208.183413	kg CO^2 eq
Climate change - Land use and LU change	EF 3.0 Method	4.425453083	kg CO^2 eq
Ecotoxicity, freshwater	EF 3.0 Method	15337.91883	CTUe
Ecotoxicity, freshwater - inorganics	EF 3.0 Method	1809.129878	CTUe
Ecotoxicity, freshwater - metals	EF 3.0 Method	10869.42071	CTUe
Ecotoxicity, freshwater - organics	EF 3.0 Method	2844.111199	CTUe
Eutrophication, freshwater	EF 3.0 Method	0.132487151	kg P eq
Eutrophication, marine	EF 3.0 Method	2.65076136	kg N eq
Eutrophication, terrestrial	EF 3.0 Method	28.8577908	mol N eq
Human toxicity, cancer	EF 3.0 Method	1.28E-06	CTUh
Human toxicity, cancer - metals	EF 3.0 Method	1.07E-06	CTUh
Human toxicity, cancer - organics	EF 3.0 Method	2.05E-07	CTUh
Human toxicity, non-cancer	EF 3.0 Method	3.49E-05	CTUh

Human toxicity, non-cancer - inorganics	EF 3.0 Method	1.44E-06	CTUh
Human toxicity, non-cancer - metals	EF 3.0 Method	3.24E-05	CTUh
Human toxicity, non-cancer - organics	EF 3.0 Method	9.81E-07	CTUh
Ionising radiation	EF 3.0 Method	800.6451099	kBq U-235 eq
Land use	EF 3.0 Method	6465.123176	Pt
Ozone depletion	EF 3.0 Method	4.78E-04	kg CFC11 eq
Particulate matter	EF 3.0 Method	1.34E-04	disease inc.
Photochemical ozone formation	EF 3.0 Method	9.169447098	kg NMVOC eq
Resource use, fossils	EF 3.0 Method	60046.03724	MJ
Resource use, minerals and metals	EF 3.0 Method	0.001987515	kg Sb eq
Water use	EF 3.0 Method	171445.3744	m3 depriv.

Table A2: Weighted environmental impact assessment across various categories in Pt units

Impact category	**Weighted results in Pt**
Acidification	0.017411948
Climate change	0.083574719
Ecotoxicity, freshwater	0.006899855
Eutrophication, freshwater	0.002308509
Eutrophication, marine	0.004014143
Eutrophication, terrestrial	0.006057591
Human toxicity, cancer	0.001611048
Human toxicity, non-cancer	0.002792634
Ionising radiation	0.00950662

Land use	0.000626264
Ozone depletion	0.00056178
Particulate matter	0.020184914
Photochemical ozone formation	0.010795318
Resource use, fossils	0.07683587
Resource use, minerals and metals	0.002357401
Water use	1.272102218

Table A3: Normalized environmental impact assessment across various categories in Pt units

Impact category	**Normalized results in Pt**
Acidification	0.280837867
Climate change	0.39684102
Ecotoxicity, freshwater	0.359367438
Eutrophication, freshwater	0.082446754
Eutrophication, marine	0.135612951
Eutrophication, terrestrial	0.16327738
Human toxicity, cancer	0.075636074
Human toxicity, non-cancer	0.151773563
Ionising radiation	0.189752891
Land use	0.00788745
Ozone depletion	0.008903003
Particulate matter	0.225278059
Photochemical ozone formation	0.225843482
Resource use, fossils	0.923508053
Resource use, minerals and metals	0.031223858
Water use	14.94832219

Appendix B.

Table 1: Sources of data collected within entire Supply Chain

Phase	**Product Data**	**Facility of General Data**
Transport of cotton	1 kg transported 5000 km by ship	
Spinning	Fiber Type 2.5 kg cotton fiber (incl. cultivation and harvest)	Energy: 0.8 kWh Water:16 L Packaging:0.5 kg Waste:0.2 kg
	Fiber loss:1.25 kg	
Transport of yarn	1.4 kg transported 1000 km by lorry	
Transport of knitted fabric	1.375 kg transported 1000 km by lorry	
Dye, Weave, Finish	Fiber loss:1.375 kg	
	Chemical Use 1.225 kg bleach H_2O_2 (knitted cotton) 1.4 kg yarn manufacture (cotton yarn) 1.35 kg drying final fixing + set of m² weight	
Transport of dyed fabric	1.35 kg transported 500 km by lorry	
Cut & Sew	Cutting efficiency:	
	1.773 m² fabric inspection + rolling onto cardboard roll	
	Material Use	
	Sundry Material and Weight	
	Packaging Material and Weight	
	Transport Mode & Distance	

Garment Finish	1.25 kg transported 1000 km by lorry	
Distribution Centers	Transport Mode & Distance 0.175 kg petrol combusted in petrol engine 66.8 kg km lorry > 16 t diesel motorway, terminated	
Product Transport	1.25 kg household wash, 60 °C, with prewash 150 min. Ironing cotton or other cellulose	
Use phase	0.25 kg waste incineration of cotton, Washing: 12.5 kg water, Ironing: 0.03 kWh	Energy:0.2 kWh (washing) Consumer washing habits3 L (washing) Waste: 0.25 kg
End of life phase	1.25 kg transported 250 km by lorry Transport of discarded T-shirt (with household refuse)	

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Table 2: Denim Life cycle Impact

	Fiber	Fabric Assembly	Cut, Sew, Finish	Sundries & Packaging	Transport, Logistics, Retail	Use phase	End of Life	Total

Climate Change (kg CO_2-e)	2.9	9.0	2.6	1.7	3.8	12.5	0.9	33.4
	9%	27%	8%	5%	11%	37%	3%	100%
Water Consumption (liters)	2,565	236	34	77	10	860	0	3781
	68%	6%	1%	2%	0%	23%	0%	100%
Eutrophication (g PO_4-e)	18.0	5.5	2.9	7.9	3.1	7.9	3.5	48.9
	37%	11%	6%	16%	6%	16%	7%	100%
Land Occupation (m^2/year)	9.3	0.2	0.0	0.5	0.3	1.7	0.0	12.0
	78%	1%	0%	4%	2%	14%	0%	100%
Abiotic Depletion (mg Sb-e)	19.9	7.2	1.9	118.5	4.4	17.9	0.1	29.1
	12%	4%	1%	70%	3%	11%	0%	100%

Table 3: Electricity consumption (all energy data for processes in kWh per kg spun yarn)

Process	Ring spindling			OPEN END spinning		
	100 % carded cotton or 100 synthetic, Ne 16s	100 % carded cotton or 100 synthetic, Ne 24s	67 % polyester and 33 % cotton, Ne 36s (carded)	100% carded cotton or 100% synthetic, Ne 10s	100% carded cotton or 100% synthetic, Ne 16s	100% carded cotton or 100% synthetic, Ne 24s
Opening	0.20	0.20	0.25	0.20	0.20	0.20
Carding	0.18	0.18	0.27	0.16	0.17	0.17

Pre-blending	-	-	0,13	-	-	-
Stretching	0.06	0.06	0.09	0.06	0.06	0.07
Roving	0.24	0.32	0.28	-	-	-
Spinning	1.12	1.95	2.83	0.60	1.11	2.04
Air conditioning (only humidity)[1]	0.21	0.31	0.47	0.10	0.16	0.24
Light[1]	0.09	0.12	0.19	0.04	0.06	0.08
Total in kWh/kg yarn	2.10	3.14	4.51	1.16	1.76	2.80
Total MJ/kg Yarn	7.6	11.3	16.2	4.2	6.3	10.1

Note (1). These figures are different because it takes a different amount of time to produce one kg of different types of yarn. Reprinted from "EDIPTEX – Environmental assessment of textiles," by S. E. Laursen, J. Hansen, H. H. Knudsen, H. Wenzel, H. F. Larsen, F. M. Kristensen, 2007, p.223. Copyright 2008 by the Danish Environmental Protection Agency.

Table 4: Source identification for environmental impact potentials related to energy (Climate Change and Eutrophication).

	Greenhouse effect	**Acidification**	**Nutrient loading**	**Photochemical ozone formation**
Materials Phase	8% of total contribution	14% of total contribution	20% of total contribution	32% of total consumption
Fiber production	Originating primarily from burning fossil fuels and energy to produce N artificial fertilizer	Arising mainly from burning fossil fuels and energy to produce N artificial fertilizer	Originating primarily from burning fossil fuels and energy to produce N artificial fertilizer	Originating from burning fossil fuels
Production phase	10% of total contribution	8% of total contribution	8% of total contribution	7% of total contribution

Yarn manufacturing	60% of this phase's contribution derives from electricity consumption in this process	78% of this phase's contribution derives from electricity consumption in this process	71% of this phase's contribution derives from electricity consumption in this process	The main part, approx. 36% of this phase's contribution derives from un-burnt fuels in connection with transport
Knitting	12% of this phase's contribution is due to electricity consumption	14% of this phase's contribution is due to electricity consumption	11% of this phase's contribution is due to electricity consumption	Not significant
Pre-treatment	8% of this phase's contribution is due to electricity consumption	3% of this phase's contribution is due to electricity consumption	7% of this phase's contribution is due to electricity consumption	16% of this phase's contribution is due to un-burnt fuel in connection with transport
Dyeing	11% of this phase's contribution is due to electricity consumption	6% of this phase's contribution is due to electricity consumption	10% of this phase's contribution is due to electricity consumption	20% of this phase's contribution is due to un-burnt fuel in connection with transport
Finishing	9% of this phase's contribution is due to electricity consumption	4% of this phase's contribution is due to electricity consumption	8% of this phase's contribution is due to electricity consumption	18% of this phase's contribution is due to un-burnt fuel in connection with transport
	Greenhouse effect	Acidification	Nutrient loading	Photochemical ozone formation
Making-up	Credit of minimal contribution due to assessed reuse potential	-4% credit of contribution due to assessed reuse potentials	-6% credit of contribution due to assessed reuse potentials	10% due to incomplete burning of fossil fuels
Use Phase	82% of total contribution	78% of total contribution	68% of total contribution	26% of total

				contribution
Washing (households)	24% of this phase's impact contribution originates from electricity consumption for heating water in the washing machine	24% (see greenhouse effect for explanation)	24% (see greenhouse effect for explanation)	24% (see greenhouse effect for explanation)
Tumbling drying	68% of this phase's impact potential is due to the consumption electricity for tumbler dryers	68% of this phase's impact potential is due to the consumption electricity for tumbler dryers	68% of this phase's impact potential is due to the consumption electricity for tumbler dryers	68% due to incomplete burning in connection with transport
Ironing	8% of this phase's impact potential is due to the consumption electricity for irons	8% of this phase's impact potential is due to the consumption electricity for irons	8% of this phase's impact potential is due to the consumption electricity for irons	8% due to incomplete burning in connection with electricity generation
Disposal Phase	Credit of impact potentials due to exploitation of energy from incineration, approx. -2% of total	Credit of impact potentials due to exploitation of energy from incineration, approx. -1% of total	Credit of impact potentials due to exploitation of energy from incineration, approx. -1% of total	Approx. 1% of this phase's total contribution originates from incineration of the T-shirt
Incineration				
Transport Phase	2% of total contribution	2% of total contribution	4% of total contribution	342% of total contribution
Transport	Transport with diesel and petrol-driven vehicles	Burning fossil fuels	Burning fossil fuels	Burning fossil fuels

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Table 5: Consumption of chemicals - cotton cultivation

Type	Active Substance	Dose per chemical (active substance)	Dose per kg packed raw cotton (g/kg)
Insecticide	Methyl Paration	1,88kg/ha	2,5
	Aldicarb	0,72 kg/ha	1
	Malathion	5,5 kg/ha	7
Herbicide	Trifluralin	0,85 kg/ha	1
	Fluometuron	0,81 kg/ha	1
	Glyphosate	1,15 kg/ha	1,5
Fungicide	Quintozene (PCNB)	0.75 kg/ha	1
	Captan	-	-
Growth Enhancer	Ethephon	1,10 kg/ha	1,5
Defoliation agent	Paraquat	0,34 kg/ha	0,5
	Natrium Chlorat	2,83 kg/ha	3,5

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Appendix C

Table.1. Inputs and outputs for the cultivation phase of coffee production, detailing resource consumption, emissions, and organic waste generation.

Processing Step	Input/Output	Material/Energy	Typical Value with unit
Cultivation	**IN(Nature)**	Land Use	5.5 m^2
		Water (Irrigation)	150-300 liters (depends on region)
		Nitrogen (N)	0.8 g
		Phosphorus (P_2O_5)	0.3 g
		Potassium (K_2O)	0.4 g
	IN(Technosphere)	Diesel (for machinery)	0.5 MJ
		Fertilizers	N= 0.8g, P =0.3g and K= 0.4g input values
		Pesticides	0.005 g
		Electricity	0.02 MJ
	OUT	Coffee Cherry	6.24 kg
		Soil Organic Matter	0.01 kg
	OUT to Technosphere	Organic Waste(by-products)	0.5 kg
		Waste water	15 l
	Emissions to Air	CO_2 (Carbon Dioxide)	150 g
		CH_4 (Methane)	0.05 g
		N_2O (Nitrous Oxide)	0.2 g
		Ammonia (NH_3)	0.01 g
	Emissions to Soil	Nitrate (NO_3^-)	0.2 g
		Phosphate (PO_4^{3-})	0.1 g
		Potassium (K^+)	0.1 g
		Cadmium	0.03g
		Lead	0.05g
		pesticides	0.3g
	Emissions to Water	BOD (Biological Oxygen Demand)	20 g
		COD (Chemical Oxygen Demand)	30 g
		Phosphate (PO_4^{3-})	0.12g
		Nitrate (NO_3^-)	0.2g

Table.2. Resource input and output analysis for the depulping stage of coffee processing, including material flow and wastewater emissions.

Processing Step	Input/Output	Material/Energy	Typical Value with unit
Depulping	**IN**	Coffee Cherry	6.24kg
		Water (Fresh water)	46.79L
		Energy (electricity for machinery)	1.932MJ
	OUT	Depulped Coffee Cherry	2.47kg
		Wastewater	40.62L
	Emissions to water	Nitrate (NO_3^-)	0.1 g per kg
		Phosphate (PO_4^{3-})	0.5 g per kg
		Biological Oxygen Demand (BOD)	15 g

		Chemical Oxygen Demand (COD)	30 g
	OUT to Technosphere	Sludge	50.57kg

Table.3. Energy and material requirements for the drying process of coffee beans, along with associated outputs and wastewater generation.

Processing Step	Input/Output	Material/Energy	Typical Value with unit
Drying	**IN**	Depulped Coffee Cherry	2.47kg
		Heat	0.00966 MJ
		Energy	1.008 MJ
	OUT	Dry Parchment Coffee	1.25kg
	OUT to Technosphere	Wastewater	1.22L

Table.4. Input-output analysis for the hulling and roasting stages of coffee processing, highlighting resource use, emissions, and waste production.

Processing Step	Input/Output	Material/Energy	Typical Value with unit
Hulling and Roasting	**IN (Nature)**	Dry Parchment Coffee	1.25kg
		Energy	0.79 MJ
		Water	10 liters
		Biomass (firewood/other)	0.4 kg (if using biomass for roasting)
	IN(Technosphere)	Electricity (Hulling)	0.10 MJ
		Diesel (Roasting)	0.3 MJ
		Natural Gas (Roasting)	0.7 MJ
		Roasting Equipment	1 Piece
		Packaging Materials (Bags)	15 g (varies based on packaging type)
	OUT (Primary)	Roasted Coffee Beans	1 kg (functional unit)
		Heat	0.280 MJ
		Energy	0.666 MJ
	OUT to Technosphere	Husk and Waste from Hulling	0.22 kg (depends on husk thickness)
		Roasting Residue	0.01 kg
		Wastewater	0.250L
		Silverskin	0.16kg
	Emissions to Air	CO_2 (Carbon Dioxide)	100 g
		CH_4 (Methane)	0.03 g
		NO_x (Nitrogen Oxides)	0.04 g
		CO (Carbon Monoxide)	0.05 g
	Emissions to Water	Suspended Solids (TSS)	0.005 kg
		COD (Chemical Oxygen Demand)	0.03 kg
		Wastewater (Cleaning)	4 liters
	Emissions to Soil	Organic Waste Leachate	Minimal

Table.5. Overview of transportation inputs and outputs for coffee beans, including energy consumption and emissions generated during transport.

Processing Step	Input/Output	Material/Energy	Typical Value with unit
Transportation	**IN (Nature)**	Water	0.3 liters
	IN(Technosphere)	Diesel (Truck Transportation)	1.0 MJ
		Gasoline (Light-duty vehicles)	0.2 MJ
		Shipping Fuel (Marine)	0.5 MJ (shipping overseas)
		Electricity (for electric vehicles)	0.2 MJ
		Tires	0.02 kg
	OUT (Primary)	Transported Coffee Beans	1.00 kg (functional unit)
	OUT to Technosphere	Used Tires	0.02 kg
		Used Oil and Fluids	0.01 kg
		Metal Scraps (vehicle maintenance)	0.001kg
	Emissions to Air	CO_2 (Carbon Dioxide)	250 g
		NO_x (Nitrogen Oxides)	0.10 g
		PM_{10} (Particulate Matter)	0.003 g
		CO (Carbon Monoxide)	0.05 g
		SO_2 (Sulfur Dioxide)	0.015 g
		CH_4 (Methane)	0.005 g
	Emissions to Water	Wastewater (vehicle cleaning)	0.1 liters
	Emissions to Soil	Oil Leaks	Minimal
		Tire Particles (from abrasion)	Minimal (Depend on distance)

Table.6. Resource consumption and emissions associated with coffee consumption, detailing inputs for brewing and outputs including spent coffee grounds.

Processing Step	Input/Output	Material/Energy	Typical Value with unit
Coffee Consumption	**IN (Nature)**	Water (tap water)	1.25 liters
		Coffee Grounds	1 kg
	IN(Technosphere)	Electricity	0.2 kWh
		Gas (for gas-powered brewers)	0.3 MJ
		Paper Coffee Filter	0.005 kg (per filter)
		Coffee Machine	1 piece
	OUT (Primary)	Brewed Coffee	1 liter
		Spent Coffee Grounds	50-60 g
	OUT to Technosphere	Used Paper Filter	0.005 kg
		Spent Coffee Grounds	60 g
		Wastewater (from cleaning)	0.2 liters
	Emissions to Air	CO_2 (Carbon Dioxide)	0.1 kg (differs by energy source)
		NO_x (Nitrogen Oxides)	0.005 g
	Emissions to Water	BOD (Biological Oxygen Demand)	0.02 g
		COD (Chemical Oxygen Demand)	0.05 g
	Emissions to Soil	Organic Waste (to compost)	60 g

Table.7. End-of-life analysis for spent coffee grounds, outlining energy use, waste disposal scenarios, and associated emissions to air, water, and soil.

Processing Step	Input/Output	Material/Energy	Typical Value with unit
EoL of Coffee waste (SCGs)	**IN(Technosphere)**	Electricity	0.02 MJ
Waste disposal scenario		Diesel	0.02 MJ
		Composting of SCGS	0.005 kg
	Waste to Technosphere	Spent Coffee Grounds	0.06 kg
		Used Paper Filters	0.005 kg
		Coffee Packaging	0.05 kg
	Emissions to Air	CO_2 (Carbon Dioxide)	0.05 kg
		CH_4 (Methane)	0.005 kg
		N_2O (Nitrous Oxide)	0.001 g
	Emissions to Water	Leachate (Nitrate, NO_3^-)	0.002 g
		Phosphate (PO_4^{3-})	0.001 g
	Emissions to Soil	Organic Waste	0.006 kg

Wet Processing Method

In wet processing, the outer skin, pulp, and mucilage are removed using water before the beans are dried. This method uses more water and energy but results in higher-quality coffee.

Table 8: Resource consumption, energy inputs, and environmental emissions associated with wet processing of coffee, focusing on water usage, mechanization, and waste by-products during green coffee bean production.

Processing Step	Input/Output	Material/Energy	Typical Value with unit
Coffee Wet Processing	**IN (Nature)**	Water (for irrigation)	300 liters
		Water (for wet processing)	20 liters
		Land use	5.5 m²
	IN (Technosphere)	Diesel (for machinery)	0.5 MJ
		Electricity (for wet mills)	1.5 MJ
		Fertilizers (Nitrogen, Phosphorus, Potassium)	N: 0.5-0.8 g, P_2O_5: 0.1-0.3 g, K_2O: 0.2-0.4 g
		Pesticides	0.005 kg
		Coffee Cherries	6.24 kg
		Depulped Coffee Cherry	2.47 kg
		Heat	10 MJ
	OUT (Primary)	Green Coffee Beans	2.47 kg
	OUT to Technosphere	Coffee Pulp (organic waste)	3 kg
	OUT to Technosphere	Wastewater (from wet processing)	20 liters
	Emissions to Air	CO_2 (Carbon dioxide)	150 g
		Methane (CH_4)	0.02 g

		Nitrous oxide (N_2O)	0.04 g
	Emissions to water	COD (Chemical Oxygen Demand)	50 g
		Nitrate (NO_3^-)	0.2 g
	Emissions to soil	Nitrate (NO_3^-)	0.2 g

Dry Processing Method

In dry processing, the whole coffee cherry is dried in the sun before the outer layers are mechanically removed. This method uses less water but requires more space and longer drying times.

Table 9: Overview of material and energy flows in dry coffee processing, emphasizing solar drying, reduced water demand, and the environmental emissions resulting from husk waste and agricultural inputs.

Processing Step	Input/Output	Material/Energy	Typical Value with unit
Coffee Dry Processing	**IN (Nature)**	Water (for irrigation)	300 liters
		Sunlight (natural energy for drying)	Variable
		Land use	5.5 m^2
	IN (Technosphere)	Diesel (for machinery)	0.5 MJ
		Fertilizers (Nitrogen, Phosphorus, Potassium)	N: 0.5-0.8 g, P_2O_5: 0.1-0.3 g, K_2O: 0.2-0.4 g
		Pesticides	0.005 kg
		Coffee Cherries	6.24 kg
	OUT (Primary)	Green coffee beans	2.47 kg
	OUT to Technosphere	Organic Waste (from coffee husks)	2 kg
	Emissions to Air	CO_2 (Carbon dioxide)	150 g
		Methane (CH_4)	0.02 g
		Nitrous oxide (N_2O)	0.04 g
	Emissions to Water	Nitrate (NO_3^-)	0.2 g
	Emission to Soil	Nitrate (NO_3^-)	0.2 g

Appendix D.

Selected articles from Scopus database for literature review

#	Authors	Title	Year	Source title	Cited by	Author Keywords	Publisher
1.	Claro D.P.; De Oliveira Claro P.B.	Coordinating B2B cross-border supply chains: The case of the organic coffee industry	2004	Journal of Business and Industrial Marketing	22	Brazil; Coffee; Organic foods; Supply chain management; The Netherlands; Trust	
2.	Oliveira G.M.; Zylbersztajn D.; Saes M.S.M.	Can contracts substitute hierarchy? Evidence from high-quality coffee supply in Brazil	2019	British Food Journal	8	Contracts; Food supply chain; Governance	Emerald Group Holdings Ltd.
3.	Sayogo D.S.; Zhang J.; Luna-Reyes L.; Jarman H.; Tayi G.; Andersen D.L.; Pardo T.A.; Andersen D.F.	Challenges and requirements for developing data architecture supporting integration of sustainable supply chains	2015	Information Technology and Management	36	I-Choose; Industrial ecology; Information integration; Interoperable data architecture; Sustainable consumption; Sustainable supply chains	Springer New York LLC
4.	Candelo E.; Casalegno C.; Civera C.; Mosca F.	Turning farmers into business partners through value co-creation projects. Insights from the coffee supply chain	2018	Sustainability (Switzerland)	31	Coffee industry; Low-power stakeholders; Stakeholder empowerment; Supply chain resilience; Supply chain vulnerability factors; Value co-creation	MDPI
5.	Richey L.A.; Ponte S.	Brand Aid and coffee value chain development interventions: Is Starbucks working aid out of business?	2021	World Development	23	Brand Aid; Celebrity humanitarianism; Coffee; Democratic Republic of Congo (DRC); Global Value Chains (GVCs); Partnerships	Elsevier Ltd
6.	Murekezi A.; Jin S.; Loveridge S.	Do organisational forms of the coffee supply chain matter in poverty reduction?	2012	Development in Practice	11	Economics; Globalisation; Labour and livelihoods - Poverty reduction; Sub-Saharan Africa	
7.	Chen M.-F.	The impacts of perceived moral obligation and sustainability self-identity on sustainability development: A theory of planned behavior purchase	2020	Business Strategy and the Environment	59	climate change skepticism; perceived moral obligation; sustainability development; sustainability self-identity; sustainability-labeled coffee; theory of planned behavior (TPB)	John Wiley and Sons Ltd

		intention model of sustainability-labeled coffee and the moderating effect of climate change skepticism					
8.	Thiruchelvam V.; Mughisha A.S.; Shahpasand M.; Bamiah M.	Blockchain-based technology in the coffee supply chain trade: Case of Burundi coffee	2018	Journal of Telecommunication, Electronic and Computer Engineering	41	Blockchain Technology; Coffee Supply Chain; Supply Chain; Technology Acceptance Model	Universiti Teknikal Malaysia Melaka
9.	Contreras-Medina D.I.; Contreras-Medina L.M.; Pardo-Nuñez J.; Olvera-Vargas L.A.; Rodriguez-Peralta C.M.	Roadmapping as a driver for knowledge creation: A proposal for improving sustainable practices in the coffee supply chain from Chiapas, Mexico, using emerging technologies	2020	Sustainability (Switzerland)	10	Coffee supply chain; Emerging technologies; Knowledge creation; Roadmapping; Sustainability	MDPI
10.	Tan G.N.D.	A Business-Model Approach on Strategic Flexibility of Firms in a Shifting Value Chain: The Case of Coffee Processors in Amadeo and Silang, Cavite, Philippines	2021	Global Journal of Flexible Systems Management	12	Business model; Coffee; Strategy; Value chain	Springer
11.	Mithöfer D.; van Noordwijk M.; Leimona B.; Cerutti P.O.	Certify and shift blame, or resolve issues? Environmentally and socially responsible global trade and production of timber and tree crops	2017	International Journal of Biodiversity Science, Ecosystem Services and Management	28	certifiability; Certification; ecosystem services; global value chain; governance; issue–attention cycle; sustainability standards; swing potential	Taylor and Francis Ltd.
12.	Karmakar A.; Karmakar S.; Mukherjee S.	Properties of various plants and animals feedstocks for biodiesel production	2010	Bioresource Technology	604	Biodiesel; Feedstocks; FFA; Renewable oil; Transesterification	Elsevier Ltd
13.	Kolk A.	Towards a Sustainable Coffee Market: Paradoxes Faced by a Multinational Company	2012	Corporate Social Responsibility and Environmental Management	36	Coffee; Fair trade; Marketing; Strategy; Supply chain; Sustainability	
14.	Kittichotsatsawat Y.; Jangkrajarng	Enhancing coffee supply chain towards sustainable growth with big data and	2021	Sustainability (Switzerland)	28	Big data analytic; Coffee supply chain; Modern technology; Smart technology	MDPI AG

	V.; Tippayawong K.Y.	modern agricultural technologies					
15.	Bager S.L.; Lambin E.F.	Sustainability strategies by companies in the global coffee sector	2020	Business Strategy and the Environment	48	certification; coffee; corporate social responsibility (CSR); environmental governance; global value chains; private sector; stakeholder theory; sustainable development; voluntary sustainability standards	John Wiley and Sons Ltd
16.	Lenzen M.; Moran D.; Kanemoto K.; Foran B.; Lobefaro L.; Geschke A.	International trade drives biodiversity threats in developing nations	2012	Nature	819		
17.	Humbert S.; Loerincik Y.; Rossi V.; Margni M.; Jolliet O.	Life cycle assessment of spray dried soluble coffee and comparison with alternatives (drip filter and capsule espresso)	2009	Journal of Cleaner Production	87	Coffee; Drip filter; Espresso; Life cycle assessment (LCA); Roast and ground; Soluble; Spray dried; Water	
18.	Vermeulen W.J.V.; Metselaar J.A.	Improving sustainability in global supply chains with private certification standards: Testing an approach for assessing their performance and impact potential	2015	International Journal of Business and Globalisation	12	Coffee; Developing countries; Fairtrade; Governance; Supply chain; Sustainable development; Utz certified	Inderscience Publishers
19.	Mayson S.; Williams I.D.	Applying a circular economy approach to valorize spent coffee grounds	2021	Resources, Conservation and Recycling	22	Circular economy; Greenhouse gas; Spent coffee grounds; Waste management; Waste-to-energy	Elsevier B.V.
20.	Tallontire A.	Partnerships in fair trade: Reflections from a case study of cafédirect	2000	Development in Practice	123		Oxfam
21.	Guimarães Y.M.; Eustachio J.H.P.P.; Leal Filho W.; Martinez L.F.; do Valle M.R.; Caldana A.C.F.	Drivers and barriers in sustainable supply chains: The case of the Brazilian coffee industry	2022	Sustainable Production and Consumption	13	Coffee industry; Coffee supply chain; Drivers and barriers; Sustainable practices; Sustainable supply chain	Elsevier B.V.

22.	Bager S.L.; Düdder B.; Henglein F.; Hébert J.M.; Wu H.	Event-Based Supply Chain Network Modeling: Blockchain for Good Coffee	2022	Frontiers in Blockchain	8	blockchain; certification; coffee; event; provenance; supply chain; sustainability	Frontiers Media SA
23.	Neilson J.; Wright J.; Aklimawati L.	Geographical indications and value capture in the Indonesia coffee sector	2018	Journal of Rural Studies	57	Cultural property; Geographical indications; Global production networks; Global value chains; Impact evaluation; Indonesia; Institutions	Elsevier Ltd
24.	Utrilla-Catalan R.; Rodríguez-Rivero R.; Narvaez V.; Díaz-Barcos V.; Blanco M.; Galeano J.	Growing Inequality in the Coffee Global Value Chain: A Complex Network Assessment	2022	Sustainability (Switzerland)	10	Complex networks analysis; Global trade network; Green coffee; Network inequality	MDPI
25.	Styles D.; Schoenberger H.; Galvez-Martos J.-L.	Environmental improvement of product supply chains: Proposed best practice techniques, quantitative indicators and benchmarks of excellence for retailers	2012	Journal of Environmental Management	30	Benchmarking; Ecolabels; Green procurement; Lifecycle assessment; Retail; Supply chains; Sustainability	Academic Press
26.	Büsser S.; Jungbluth N.	The role of flexible packaging in the life cycle of coffee and butter	2009	International Journal of Life Cycle Assessment	77	Backed goods; Brewing; Butter; Coffee; Cold storage; Consumer behaviour; Espresso; Flexible packaging; Food products; Milk	
27.	Neilson J.; Wang J.-H.Z.	China and the changing economic geography of coffee value chains	2019	Singapore Journal of Tropical Geography	16	China; Coffee; economic geography; Southeast Asia; value chains; Yunnan	Blackwell Publishing Ltd
28.	Alamsyah A.; Widiyanesti S.; Wulansari P.; Nurhazizah E.; Dewi A.S.; Rahadian D.; Ramadhani D.P.; Hakim M.N.; Tyasamesi P.	Blockchain traceability model in the coffee industry	2023	Journal of Open Innovation: Technology, Market, and Complexity	12	Blockchain technology; Coffee industry; Quality assurance; Supply chain; Traceability	Elsevier B.V.
29.	Dionysis S.; Chesney T.; McAuley D.	Examining the influential factors of consumer purchase intentions for	2022	British Food Journal	32	Blockchain; Coffee; Theory of planned behaviour; Traceability	Emerald Publishing

		blockchain traceable coffee using the theory of planned behaviour					
30.	Acosta-Alba I.; Boissy J.; Chia E.; Andrieu N.	Integrating diversity of smallholder coffee cropping systems in environmental analysis	2020	International Journal of Life Cycle Assessment	16	Agroforestry; Associated crops; Coffee; Diversified cropping system; Life cycle assessment; Shade management; Smallholders	Springer
31.	Nolasco A.; Squillante J.; Velotto S.; D'Auria G.; Ferranti P.; Mamone G.; Errico M.E.; Avolio R.; Castaldo R.; Cirillo T.; Esposito F.	Valorization of coffee industry wastes: Comprehensive physicochemical characterization of coffee silverskin and multipurpose recycling applications	2022	Journal of Cleaner Production	8	Agro-food waste; Coffee by-products; Integument; Recycling; Silverskin	Elsevier Ltd
32.	Macdonald K.	Globalising justice within coffee supply chains? Fair Trade, Starbucks and the transformation of supply chain governance	2007	Third World Quarterly	114		
33.	Torabzadeh S.A.; Nejati E.; Aghsami A.; Rabbani M.	A dynamic multi-objective green supply chain network design for perishable products in uncertain environments, the coffee industry case study	2022	International Journal of Management Science and Engineering Management	22	coffee industry; Green supply chain; multi-objective; network design; perishability; uncertainty	Taylor and Francis Ltd.
34.	Courville S.	Use of indicators to compare supply chains in the coffee industry	2003	Greener Management International	29	Case study; Coffee; Costa Rica; Indicators; ISO 14001; Mexico; Processing; Production; Supply chains	Greenleaf Publishing
35.	Chen S.-H.; Huang J.; Tham A.	A systematic literature review of coffee and tea tourism	2020	International Journal of Culture, Tourism, and Hospitality Research	13	Agritourism; Coffee and tea tourism; Social capital; Social networks; Supply chain; Value chain	Emerald Group Holdings Ltd.
36.	Millard E.	Still brewing: Fostering sustainable coffee production	2017	World Development Perspectives	23	Certification; Coffee; Deforestation; Gender; Standards; Sustainability	Elsevier Ltd

37.	Alvarez G.; Pilbeam C.; Wilding R.	Nestlé Nespresso AAA sustainable quality program: An investigation into the governance dynamics in a multi-stakeholder supply chain network	2010	Supply Chain Management	164	Coffee; Economic sustainability; Governance; Supply chain management	
38.	Giraldi-Díaz M.R.; De Medina-Salas L.; Castillo-González E.; León-Lira R.	Environmental impact associated with the supply chain and production of grounding and roasting coffee through life cycle analysis	2018	Sustainability (Switzerland)	12	Carbon; Coffee production; Environmental impact; Life cycle assessment (LCA); Water and energy footprint	MDPI
39.	Bager S.L.; Singh C.; Persson U.M.	Blockchain is not a silver bullet for agro-food supply chain sustainability: Insights from a coffee case study	2022	Current Research in Environmental Sustainability	22	Blockchain implementation; Coffee supply chain; Colombia; Sustainability governance; Traceability; Transparency	Elsevier B.V.
40.	Mendoza R.; Bastiaensen J.	Fair trade and the coffee crisis in the Nicaraguan Segovias	2003	Small Enterprise Development	26		Intermediate Technology Publications Ltd
41.	Neilson J.	Institutions, the governance of quality and on-farm value retention for Indonesian specialty coffee	2007	Singapore Journal of Tropical Geography	33	Coffee; Geographical indication; Global commodity chains; Indonesia; Institutions; Quality governance	
42.	Flammini A.; Brundin E.; Grill R.; Zellweger H.	Supply chain uncertainties of small-scale coffee husk-biochar production for activated carbon in Vietnam	2020	Sustainability (Switzerland)	8	Activated carbon; Biochar; Bioeconomy; Cleaner production; Coffee; Pyrolysis; Supply chain; Uncertainty analysis; Vietnam	MDPI
43.	Tallyn E.; Pschetz L.; Gianni R.; Speed C.; Elsden C.	Exploring machine autonomy and provenance data in coffee consumption: A field study of bitbarista	2018	Proceedings of the ACM on Human-Computer Interaction	17	Additional Key Words; Distributed autonomous systems; Distributed ledger technologies; Heteromation; Phrases: Blockchain; Provenance; Supply chains.	Association for Computing Machinery
44.	Duarte A.; Sarache W.; Costa Y.	Biofuel supply chain design from Coffee Cut Stem under environmental analysis	2016	Energy	38	Biofuel production; Coffee Cut Stem; GHG emissions; Supply chain optimization	Elsevier Ltd
45.	Noponen M.R.A.; Edwards-Jones G.; Haggar J.P.; Soto G.;	Greenhouse gas emissions in coffee grown with differing input levels under conventional and organic management	2012	Agriculture, Ecosystems and Environment	62	Agroforestry systems; Carbon footprinting; Climate change; Coffee; Nitrous oxide	

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46.	Naegele H.	Where does the Fair Trade money go? How much consumers pay extra for Fair Trade coffee and how this value is split along the value chain	2020	World Development	15	Coffee; Fair trade; Price premium; Value chain; Voluntary sustainability standards	Elsevier Ltd
47.	Donnet M.L.; Weatherspoon D.D.; Moss C.B.	Measuring food product differentiation by quality ratings: A cross-entropy analysis of specialty coffee e-auctions	2010	Journal of Agricultural Economics	13	E-Auctions; Entropy analysis; Information; Product differentiation measure; Quality ratings; Speciality agri-food supply chain performance assessment; Speciality coffee	
48.	Hajjar R.; Newton P.; Adshead D.; Bogaerts M.; Maguire-Rajpaul V.A.; Pinto L.F.G.; McDermott C.L.; Milder J.C.; Wollenberg E.; Agrawal A.	Scaling up sustainability in commodity agriculture: Transferability of governance mechanisms across the coffee and cattle sectors in Brazil	2019	Journal of Cleaner Production	38	Certification; Sustainable intensification; Voluntary environmental governance mechanisms	Elsevier Ltd
49.	Chávez M.M.M.; Sarache W.; Costa Y.	Towards a comprehensive model of a biofuel supply chain optimization from coffee crop residues	2018	Transportation Research Part E: Logistics and Transportation Review	40	Biofuel supply chain design; Coffee residues; Multiobjective programming; Sustainability	Elsevier Ltd
50.	Maskell G.; Chemura A.; Nguyen H.; Gornott C.; Mondal P.	Integration of Sentinel optical and radar data for mapping smallholder coffee production systems in Vietnam	2021	Remote Sensing of Environment	16	Agroforestry; Crop mask; Data fusion; Google Earth Engine; Random forest; Sentinel-1; Sentinel-2; Smallholder agriculture	Elsevier Inc.
51.	Ortiz-Miranda D.; Moragues-Faus A.M.	Governing fair trade coffee supply: Dynamics and challenges in small farmers' organizations	2015	Sustainable Development	22	Coffee; Cooperatives; Fair trade; Guatemala; Organic; Small-scale farmers; Sustainable supply chain governance; Upgrading strategies	John Wiley and Sons Ltd
52.	Kouadio L.; Tixier P.; Byrareddy V.; Marcussen T.;	Performance of a process-based model for predicting	2021	Ecological Modelling	9	Biophysical model; Climate risk management; Climate variability; Coffea canephora	Elsevier B.V.

	Mushtaq S.; Rapidel B.; Stone R.	robusta coffee yield at the regional scale in Vietnam					
53.	Abuabara L.; Paucar-Caceres A.; Burrowes-Cromwell T.	Consumers' values and behaviour in the Brazilian coffee-in-capsules market: promoting circular economy	2019	International Journal of Production Research	53	analytic hierarchy process; Brazil coffee- in-capsules; circular economy; consumer green values; reverse logistics; supply chain management and Brazilian coffee industry; sustainable business; valued-focused thinking	Taylor and Francis Ltd.
54.	Cock J.; Oberthür T.; Isaacs C.; Läderach P.R.; Palma A.; Carbonell J.; Victoria J.; Watts G.; Amaya A.; Collet L.; Lema G.; Anderson E.	Crop management based on field observations: Case studies in sugarcane and coffee	2011	Agricultural Systems	30	Coffee; Innovation; Operational research; Precision agriculture; Site specific agriculture; Sugarcane	Elsevier Ltd
55.	Rotaris L.; Danielis R.	Willingness to pay for fair trade coffee: A conjoint analysis experiment with Italian consumers	2011	Journal of Agricultural and Food Industrial Organization	28	coffee; conjoint analysis; discrete choice models; experimental design; fair trade	
56.	Bray J.; Neilson J.	Examining the interface of sustainability programmes and livelihoods in the Semendo highlands of Indonesia	2018	Asia Pacific Viewpoint	13	certification; coffee; livelihoods; standards; Sumatra; value-chains	Blackwell Publishing Ltd
57.	Bashiri M.; Tjahjono B.; Lazell J.; Ferreira J.; Perdana T.	The dynamics of sustainability risks in the global coffee supply chain: A case of Indonesia–UK	2021	Sustainability (Switzerland)	17	Coffee supply chain; Multiple criteria; Risks; Sustainability; System dynamics	MDPI AG
58.	Niederhauser N.; Oberthür T.; Kattnig S.; Cock J.	Information and its management for differentiation of agricultural products: The example of specialty coffee	2008	Computers and Electronics in Agriculture	30	Agricultural product differentiation; Agricultural supply chains; Information management; Internet-based; Specialty coffee	
59.	Kolk A.	Mainstreaming sustainable coffee	2013	Sustainable Development	62	Certification; Coffee; Consumers; Corporate social responsibility; Fair trade; Multinationals; Standards; Supply chain; Sustainability	

60.	Blowfield M.	Ethical supply chains in the cocoa, coffee and tea industries	2003	Greener Management International	75	Corporate social responsibility; Ethical trade; Fair trade; International development; Supply chains	Greenleaf Publishing
61.	Kouadio L.; Byrareddy V.M.; Sawadogo A.; Newlands N.K.	Probabilistic yield forecasting of robusta coffee at the farm scale using agroclimatic and remote sensing derived indices	2021	Agricultural and Forest Meteorology	9	Climate risk management; Coffea canephora; Crop yield forecasting; Remote sensing	Elsevier B.V.
62.	Trollman H.; Garcia-Garcia G.; Jagtap S.; Trollman F.	Blockchain for Ecologically Embedded Coffee Supply Chains	2022	Logistics	14	blockchain; circular economy; coffee; ecological embeddedness; supply chain; sustainability	Multidisciplinary Digital Publishing Institute (MDPI)
63.	Avraamidou S.; Baratsas S.G.; Tian Y.; Pistikopoulos E.N.	Circular Economy - A challenge and an opportunity for Process Systems Engineering	2020	Computers and Chemical Engineering	77	Circular Economy; Process Systems Engineering; Sustainability	Elsevier Ltd
64.	Elder S.D.; Lister J.; Dauvergne P.	Big retail and sustainable coffee: A new development studies research agenda	2014	Progress in Development Studies	37	certification; environmental governance; fair trade; retail; supply chains; sustainable coffee	SAGE Publications Ltd
65.	Ruben R.	Impact assessment of commodity standards: Towards inclusive value chains	2017	Enterprise Development and Microfinance	18	Certification; Commodity standards; Impact; Smallholders; Tropical agro-food crops	Practical Action Publishing
66.	Grabs J.	Assessing the institutionalization of private sustainability governance in a changing coffee sector	2020	Regulation and Governance	32	certification; corporate social responsibility; environmental governance; private governance; sustainability	Blackwell Publishing
67.	Neilson J.; Pritchard B.	Green coffee? The contradictions of global sustainability initiatives from an Indian perspective	2007	Development Policy Review	49		
68.	Auroi C.	Improving sustainable chain management through fair trade	2003	Greener Management International	21	Agricultural commodities; Codes of conduct; Coffee; Fair trade; Latin America; Small farmers; Transnational corporations	Greenleaf Publishing
69.	Carvalho J.M.; Paiva E.L.; Vieira L.M.	Quality attributes of a high specification product: Evidences from the speciality coffee business	2016	British Food Journal	33	Buyer-seller relationship; Coffee; Product quality; Supply-chain management	Emerald Group Publishing Ltd.

70.	Lerner D.G.; Pereira H.M.F.; Saes M.S.M.; de Oliveira G.M.	When unfair trade is also at home: The economic sustainability of coffee farms	2021	Sustainability (Switzerland)	8	Coffee; Farm-gate prices; FOB prices; Unfair trading	MDPI AG
71.	Clavijo-Buritica N.; Triana-Sanchez L.; Escobar J.W.	A hybrid modeling approach for resilient agri-supply network design in emerging countries: Colombian coffee supply chain	2023	Socio-Economic Planning Sciences	13	Agri-food supply chains; Availability; Connectivity; Optimization; Risk management; Supply chain resilience	Elsevier Ltd
72.	Bunn C.; Läderach P.; Ovalle Rivera O.; Kirschke D.	A bitter cup: climate change profile of global production of Arabica and Robusta coffee	2015	Climatic Change	309		Kluwer Academic Publishers
73.	de Almeida L.F.; Zylbersztajn D.	Key success factors in the brazilian coffee agrichain: Present and future challenges	2017	International Journal on Food System Dynamics	15	Agribusiness; Coffee; Critical success factors	CentMa GmbH
74.	van Hille I.; de Bakker F.G.A.; Ferguson J.E.; Groenewegen P.	Cross-sector partnerships for sustainability: How mission-driven conveners drive change in national coffee platforms	2020	Sustainability (Switzerland)	21	Certification; Coffee; Convener; Convening; Cross-sector partnerships; Mission-driven organization; SDGs; Strategy; Sustainability; Sustainable supply chains	MDPI
75.	Webb J.	Seduced or sceptical consumers? Organised action and the case of fair trade coffee	2007	Sociological Research Online	16	Coffee; Consumers; Consumption; Fair trade; Social movement organisations	University of Surrey
76.	Tharatipyakul A.; Pongnumkul S.; Riansumrit N.; Kingchan S.; Pongnumkul S.	Blockchain-Based Traceability System From the Users' Perspective: A Case Study of Thai Coffee Supply Chain	2022	IEEE Access	8	Blockchain; coffee; interview; supply chain; survey; traceability; user-centered design	Institute of Electrical and Electronics Engineers Inc.
77.	Ramirez-Villegas J.; Salazar M.; Jarvis A.; Navarro-Racines C.E.	A way forward on adaptation to climate change in Colombian agriculture: Perspectives towards 2050	2012	Climatic Change	83		
78.	Millard E.	Incorporating agroforestry approaches into commodity value chains	2011	Environmental Management	36	Agroforestry; Brands; Certification; Markets; Sustainability	

79.	Tibola C.S.; da Silva S.A.; Dossa A.A.; Patrício D.I.	Economically Motivated Food Fraud and Adulteration in Brazil: Incidents and Alternatives to Minimize Occurrence	2018	Journal of Food Science	59	Brazilian food market; food fraud and adulteration; good practices	Blackwell Publishing Inc.
80.	La Scalia G.; Saeli M.; Miglietta P.P.; Micale R.	Coffee biowaste valorization within circular economy: an evaluation method of spent coffee grounds potentials for mortar production	2021	International Journal of Life Cycle Assessment	27	Circular economy; Coffee supply chain; Construction material; Food waste valorization; Life cycle approach; Multi-criteria analysis; Sustainability	Springer Science and Business Media Deutschland GmbH
81.	Mihailova A.; Liebisch B.; Islam M.D.; Carstensen J.M.; Cannavan A.; Kelly S.D.	The use of multispectral imaging for the discrimination of Arabica and Robusta coffee beans	2022	Food Chemistry: X	8	Adulteration; Arabica coffee; Authenticity; Multispectral imaging; Robusta coffee; Substitution	Elsevier Ltd
82.	Ricciardi P.; Cillari G.; Carnevale Miino M.; Collivignarelli M.C.	Valorization of agro-industry residues in the building and environmental sector: A review	2020	Waste Management and Research	48	acoustic insulation; agro-industry waste; Circular economy; pollutants removal; recycled material; thermal insulation; wastewater treatment	SAGE Publications Ltd
83.	Usva K.; Sinkko T.; Silvenius F.; Riipi I.; Heusala H.	Carbon and water footprint of coffee consumed in Finland—life cycle assessment	2020	International Journal of Life Cycle Assessment	21	Carbon footprint; Coffee; LCA; Life cycle assessment; Water footprint; Water scarcity	Springer Science and Business Media Deutschland GmbH
84.	Barbosa B.C.F.; Silva S.C.; de Oliveira R.R.; Chalfun A., Jr.	Zinc supply impacts on the relative expression of a metallothionein-like gene in Coffea arabica plants	2017	Plant and Soil	16	Coffee; Metallothionein; Plant nutrition; RT-qPCR; Zinc	Springer International Publishing
85.	Garrett R.D.; Lambin E.F.; Naylor R.L.	Land institutions and supply chain configurations as determinants of soybean planted area and yields in Brazil	2013	Land Use Policy	98	Brazil; Credit; Land tenure; Land use; Soybean production; Supply chain	
86.	Rich K.M.; Chengappa P.G.; Muniyappa A.; Yadava C.G.; Manjyapura G.S.;	Coffee certification in India: Awareness, practices, and sustainability perception of growers	2018	Agroecology and Sustainable Food Systems	17	Branding; certification; conservation; ecosystem services; labeling; marketing; organic coffee; shade grown coffee	Taylor and Francis Inc.

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87.	Baratsas S.G.; Pistikopoulos E.N.; Avraamidou S.	A systems engineering framework for the optimization of food supply chains under circular economy considerations	2021	Science of the Total Environment	32	Circular economy; Coffee supply chain; Multi-objective optimization; Resource-Task-Network; Superstructure optimization	Elsevier B.V.
88.	Grabs J.; Kilian B.; Hernández D.C.; Dietz T.	Understanding coffee certification dynamics: A spatial analysis of voluntary sustainability standard proliferation	2016	International Food and Agribusiness Management Review	23	Coffee; Standard take-up; Sustainable value chains; Voluntary sustainability standards	International Food and Agribusiness Management Association
89.	Lachman J.; Lisý M.; Baláš M.; Matúš M.; Lisá H.; Milčák P.	Spent coffee grounds and wood co-firing: Fuel preparation, properties, thermal decomposition, and emissions	2022	Renewable Energy	5	Co-firing; Emissions; Pelleting; Spent coffee grounds; TGA	Elsevier Ltd
90.	Kanamaru T.	Production management as an ordering of multiple qualities: negotiating the quality of coffee in Timor-Leste	2020	Journal of Cultural Economy	4	Coffee; qualification of objects; quality conventions; quality uncertainty; semiotic ideology	Routledge
91.	Chopra A.; Kundu A.	The Fair tracing project: Digital tracing technology and Indian coffee	2008	Contemporary South Asia	6		
92.	Saputra I.; Arkeman Y.; Jaya I.; Hermadi I.; Akbar N.A.; Sutedja I.	AniraBlock: A leap towards dynamic smart contracts in agriculture using blockchain based key-value format framework	2023	Communications in Science and Technology	0	Blockchain; coffee; smart contract, fish; supply chain	Komunitas Ilmuwan dan Profesional Muslim Indonesia
93.	León-Bravo V.; Ciccullo F.; Caniato F.	Traceability for sustainability: seeking legitimacy in the coffee supply chain	2022	British Food Journal	5	Coffee industry; Legitimacy theory; Sustainability; Traceability	Emerald Group Holdings Ltd.
94.	Sakamoto H.; Bruschi L.T.; Kulay L.; Yamakami A.	Using the Life Cycle Approach for Multiobjective Optimization in the Context of the Green Supply Chain:	2023	Sustainability (Switzerland)	0	Brazilian coffee; green supply chain; life cycle assessment; multiobjective optimization	Multidisciplinary Digital Publishing Institute (MDPI)

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95.	Rahmah D.M.; Purnomo D.; Filianty F.; Ardiansah I.; Pramulya R.; Noguchi R.	Social Life Cycle Assessment of a Coffee Production Management System in a Rural Area: A Regional Evaluation of the Coffee Industry in West Java, Indonesia	2023	Sustainability (Switzerland)	1	coffee industry; life cycle assessment; social impact	Multidisciplinary Digital Publishing Institute (MDPI)
96.	Servín-Juárez R.; Trejo-Pech C.J.O.; Pérez-Vásquez A.Y.; Reyes-Duarte Á.	Specialty coffee shops in Mexico: Factors influencing the likelihood of purchasing high-quality coffee	2021	Sustainability (Switzerland)	5	Coffee from mexico; Coffee quality attributes; Coffee shops; Specialty coffee; Sustainability of small-scale coffee farmers; Value-based supply chain	MDPI AG
97.	Ruippo L.; Kylkilahti E.; Sekki S.; Autio M.	"It probably could've done with less plastic" - Consumers' cyclical and uneasy relationship with food packaging	2023	Frontiers in Sustainability	0	food packaging; market device; morality; plastic; recycling; sustainability; sustainable food consumption; waste	Frontiers Media SA
98.	Umaran T.; Perdana T.; Kurniadie D.; Parikesit P.	Co-Creation Approach in Designing a Sustainable Coffee Supply Chain (a Case in Bandung Regency, West Java, Indonesia)	2022	Sustainability (Switzerland)	4	Action research; Co-creation; Coffee agribusiness; Supply chain	MDPI
99.	Bray J.G.P.	Institutional environments and the livelihood impacts of voluntary sustainability standards: A Village-based analysis from southern Sumatra's coffee sector	2019	Singapore Journal of Tropical Geography	4	4C; certification; Institutional environment; livelihoods; Sumatra; voluntary sustainability standards	Blackwell Publishing Ltd
100.	Proença J.F.; Torres A.C.; Marta B.; Silva D.S.; Fuly G.; Pinto H.L.	Sustainability in the Coffee Supply Chain and Purchasing Policies: A Case Study Research	2022	Sustainability (Switzerland)	3	Agrifood products; Buying process; Coffee business and production; Delta Cafés; Food safety; Grupo Nabeiro; Purchasing policies; Supply chain; Sustainability; Sustainable business; Sustainable practices	MDPI
101.	Shanker S.; Sharma H.; Barve A.	Analysing the critical success factors and the risks associated with third-party logistics in the food supply	2022	Journal of Advances in Management Research	5	Coffee supply chain; Critical success factor (CSF); Food supply chain; Fuzzy ISM-MICMAC; Fuzzy TOPSIS; Third-party logistics (3PLs)	Emerald Group Holdings Ltd.

		chain: a case of coffee industry					
102.	Sengere R.W.; Curry G.N.; Koczberski G.	Forging alliances: Coffee grower and chain leader partnerships to improve productivity and coffee quality in Papua New Guinea	2019	Asia Pacific Viewpoint	8	coffee; collective action; partnerships; productivity; smallholders	Blackwell Publishing Ltd
103.	Kangile J.R.; Kadigi R.M.J.; Mgeni C.P.; Munishi B.P.; Kashaigili J.; Munishi P.K.T.	Dynamics of coffee certifications in producer countries: Re-examining the tanzanian status, challenges and impacts on livelihoods and environmental conservation	2021	Agriculture (Switzerland)	2	Certification; Coffee; Endogenous switching regression; Environmental conservation; Livelihoods; Sustainability	MDPI
104.	Laili N.; Djatna T.; Indrasti N.S.; Yani M.	Optimization of industrial symbiosis in coffee-based eco-industrial park design	2024	Global Journal of Environmental Science and Management		Circular economy; Closed-loop production; Coffee agroindustry; Sustainable production; Systems engineering; Waste management management	GJESM Publication
105.	Vochozka M.; Petrách F.; Janek S.	CHANGES IN PERCEPTION OF COFFEE IN EU: LUXURY GOOD TURNED INFERIOR	2022	Economics and Sociology	2	coffee; demand; EU; income elasticity; price elasticity	Centre of Sociological Research
106.	Huffaker R.; Griffith G.; Dambui C.; Canavari M.	Empirical detection and quantification of price transmission in endogenously unstable markets: The case of the global–domestic coffee supply chain in papua New Guinea	2021	Sustainability (Switzerland)	2	Market instability; Nonlinear empirical dynamics	MDPI
107.	Mendes K.; Luchine A.	Non-tariff barriers removal in the Brazilian coffee industry	2020	Journal of International Trade Law and Policy	2	Brazil; Developing countries; Instant coffee supply chain; Non-tariff barriers; Partial equilibrium; Vertical integration	Emerald Group Holdings Ltd.
108.	Renard M.-C.	Values and the making of standards in 'sustainable'	2022	International Sociology	1	4C code of conduct; coffee production; Nestlé; sustainability standards	SAGE Publications Ltd

		coffee networks: The case of 4C and Nestlé in México					
109.	Haryono A.; Maarif M.S.; Suroso A.I.; Jahroh S.	The Design of a Contract Farming Model for Coffee Tree Replanting	2023	Economies	1	coffee; contract farming; replanting; soft system methodology	Multidisciplinary Digital Publishing Institute (MDPI)
110.	Nguyen T.T.H.; Le T.M.; Bekrar A.; Abed M.	Some Insights Into Effective Demand Planning	2022	IEEE Engineering Management Review	0	Coffee supply chain; demand planning; forecasting; operational performance	Institute of Electrical and Electronics Engineers Inc.
111.	Kangile J.R.; Kadigi R.M.J.; Mgeni C.P.; Munishi B.P.; Kashaigili J.; Munishi P.K.T.	The role of coffee production and trade on gender equity and livelihood improvement in Tanzania	2021	Sustainability (Switzerland)	6	Coffee; Gender; Livelihood; Supply chain; Trade	MDPI
112.	Wilson N.L.W.; Wilson A.; Whitttingham K.	Helping consumers "know who grows" their coffee: The case of THRIVE farmers coffee	2013	International Food and Agribusiness Management Review	1	Fair trade; Specialty coffee; Supply chain; THRIVE Farmers' Coffee	
113.	Gazzola P.; Pavione E.; Barge A.; Fassio F.	Using the Transparency of Supply Chain Powered by Blockchain to Improve Sustainability Relationships with Stakeholders in the Food Sector: The Case Study of Lavazza	2023	Sustainability (Switzerland)	2	blockchain; food; Lavazza; supply chain	MDPI
114.	Gosalvitr P.; Cuéllar-Franca R.M.; Smith R.; Azapagic A.	An environmental and economic sustainability assessment of coffee production in the UK	2023	Chemical Engineering Journal	4	Food and drink; Ground coffee; Instant coffee; Life cycle assessment; Life cycle costing; Process modelling	Elsevier B.V.
115.	Wang C.-N.; Yu M.-C.; Ho N.-N.-Y.; Le T.-N.	An integrated forecasting model for the coffee bean supply chain	2021	Applied Economics	2	coffee Bean; forecasting Model; Optimization; supply Chain Management	Routledge
116.	Mohamadi D.; Mohammadi M.	Pricing and advertising in dual-channel supply chains: real applications for coffee processing and distribution companies	2024	International Journal of Management Science and Engineering Management	0	advertising; coffee industry; dual-channel supply chain; dynamic games; game theory; Pricing	Taylor and Francis Ltd.

117.	Sporchia F.; Caro D.; Bruno M.; Patrizi N.; Marchettini N.; Pulselli F.M.	Estimating the impact on water scarcity due to coffee production, trade, and consumption worldwide and a focus on EU	2023	Journal of Environmental Management	3	Coffee; European Union; Sustainable production and consumption; Sustainable water use; Water scarcity footprint	Academic Press
118.	Fontana E.; Pisalyaput N.	Understanding the importance of farmer–NGO collaboration for sustainability and business strategy: Evidence from the coffee supply chain	2023	Business Strategy and the Environment	1	business strategy; coffee supply chain; domestic markets; farmer–NGO collaboration; human ecology; sustainability challenges	John Wiley and Sons Ltd
119.	Quiñones-Ruiz X.F.	Social brokerage: Encounters between Colombian coffee producers and Austrian Buyers – A research-based relational pathway	2021	Geoforum	7	Austria; Coffee producers; Colombia; Global value chains; Roasters; Social brokerage	Elsevier Ltd
120.	Ramos E.; Mesia R.; Cavero C.; Vera B.; Wu Z.	Modeling the distribution of organic coffee Supply Chain from Junín region, Peru	2019	International Journal of Supply Chain Management	5	Coffee; Delivery; Distribution; Food supply chain management (SCM); Performance; Peru; Supply chain; Supply chain management; Transportation	ExcelingTech
121.	Durevall D.	Fairtrade and market efficiency: Fairtrade-labeled coffee in the Swedish coffee market	2020	Economies	2	Coffee supply chain; Fair trade; Fairtrade; Market power	MDPI Multidisciplinary Digital Publishing Institute
122.	Pereira M.M.O.; Silva M.E.; Hendry L.C.	Developing global supplier competences for supply chain sustainability: The effects of institutional pressures on certification adoption	2023	Business Strategy and the Environment	5	certification; competence; emerging economy; institutional pressures; supplier country context; supply chain sustainability	John Wiley and Sons Ltd
123.	Schaafsma M.; Dreoni I.; Ayompe L.M.; Egoh B.N.; Ekayana D.P.; Favareto A.; Mumbunan S.;	Mapping social impacts of agricultural commodity trade onto the sustainable development goals	2023	Sustainable Development	3	commodity production; global value chains; indicators; multidimensional wellbeing; sustainable development goals	John Wiley and Sons Ltd

	Nakagawa L.; Ngouhouo-poufoun J.; Sassen M.; Uehara T.K.; Matthews Z.						
124.	Valencia-Payan C.; Grass-Ramirez J.F.; Ramirez-Gonzalez G.; Corrales J.C.	A Smart Contract for Coffee Transport and Storage With Data Validation	2022	IEEE Access	2	Blockchain; coffee; coffee certifications; reliability; smart contract; storage; traceability; transport	Institute of Electrical and Electronics Engineers Inc.
125.	Arslan C.; Gregg D.; Wollni M.	Paying more to make less: value degrading in the coffee value chain in eastern Uganda	2024	American Journal of Agricultural Economics	0	asymmetric information; coffee; market for lemons; quality uncertainty; Uganda; upgrading; value chains	John Wiley and Sons Inc
126.	Quan N.M.; Phung H.M.; Uyen L.; Dat L.Q.; Ngoc L.G.; Hoang N.M.; Tu T.K.M.; Dung N.H.; Ai C.T.D.; Trinh D.N.T.	Species and geographical origin authenticity of green coffee beans using UV–VIS spectroscopy and PLS–DA prediction model	2023	Food Chemistry Advances	4	Green coffee bean authenticity; Origin authenticity; PLS–DA; Species authenticity; Ultraviolet–visible spectroscopy	Elsevier Ltd
127.	Bal A.B.; Rajput T.; Mishra B.	Drinking a Sustainable Cup of Coffee: How to Reliably Transmit Sustainability Information in Supply Chains?	2020	International Trade Law and Regulation	0	Coffee; Data collection; Farmers; India; International trade; Small and medium-sized enterprises; Supply chains; Sustainability	Sweet and Maxwell
128.	Mohammadi M.; Mohamadi D.; Nikzad A.	Equilibrium pricing in supply chains with discrete stochastic demands: A case study in coffee supply and distribution industry	2023	Journal of Industrial and Production Engineering	1	coffee supply chain; discrete selection models; equilibrium pricing; game theory; Price competition	Taylor and Francis Ltd.
129.	Nguyen T.V.; Nguyen N.C.; Bosch O.J.H.	Identifying key success factors in supply chain management for increasing the competitive advantages of Vietnamese coffee	2017	Competitiveness Review	6	Bayesian belief networks; Coffee supply chain; Competitive advantage; Leverage points; Supply chain management; Systems archetypes	Emerald Group Publishing Ltd.
130.	Samoggia A.; Fantini A.	Revealing the Governance Dynamics of the Coffee	2023	Sustainability (Switzerland)	0	agro-food chain; certifications; coffee; fairness; governance	Multidisciplinar y Digital

		Chain in Colombia: A State-of-the-Art Review					Publishing Institute (MDPI)
131.	Putithanarak N.; Klongthong W.; Thavorn J.; Ngamkroeckjoti C.	Predicting Consumers' Repurchase Intention of Ready-to-Drink Coffee: A Supply Chain from Thai Producers to Retailers	2022	Journal of Distribution Science	3	Behavioral reintention; Coffee chains; Coffee shops; Content sensory attribute beliefs; Distribution channels; Perceived utilitarian value; Price signaling; Ready-to-drink coffee; Retail stores; Theory of planned behavior	Korea Distribution Science Association (KODISA)
132.	Miglietta P.P.; Fischer C.; De Leo F.	Virtual water flows and economic water productivity of Italian fair-trade: the case of bananas, cocoa and coffee	2022	British Food Journal	5	Agrifood; Developing countries; Fair-trade; International trade; Italy; Water footprint	Emerald Publishing
133.	Nguyen Minh Q.; Lai Q.D.; Nguy Minh H.; Tran Kieu M.T.; Lam Gia N.; Le U.; Hang M.P.; Nguyen H.D.; Chau T.D.A.; Doan N.T.T.	Authenticity green coffee bean species and geographical origin using near-infrared spectroscopy combined with chemometrics	2022	International Journal of Food Science and Technology	3	Classification; geographical origin; green coffee bean; NIR spectroscopy; PLS-DA; species	John Wiley and Sons Inc
134.	Sporchia F.; Taherzadeh O.; Caro D.	Stimulating environmental degradation: A global study of resource use in cocoa, coffee, tea and tobacco supply chains	2021	Current Research in Environmental Sustainability	6	Fertiliser use; International trade; Land footprint; Material Flow Accounting; Stimulant crops; Water footprint	Elsevier B.V.
135.	Panggabean Y.B.S.; Arsyad M.; Nasaruddin; Mahyuddin	The Future of Coffee, Digital Technology and Farmer's Income	2023	International Journal of Sustainable Development and Planning	0	Arabica coffee; digital agriculture; digital technology; SEM-PLS	International Information and Engineering Technology Association
136.	Haldar T.; Damodaran A.	Identifying market power of retailers and processors: Evidence from coffee supply chain in India	2022	IIMB Management Review	6	Coffee supply chain; Market power; Price transmission; Processors; Retailers	Elsevier Ltd
137.	Ghoshray A.; Mohan S.	Coffee price dynamics: An analysis of the retail-international price margin	2021	European Review of Agricultural Economics	3	coffee roasting industry; coffee supply chain; market power; Momentum	Oxford University Press

						Threshold Autoregression (M-TAR); price dynamics; price margin	

Appendix E.

List of sub variables included to conduct the survey on coffee supply chain sustainability

Indicator type	Variables	Sub-variables
Social	Labor Practices	Percentage of workers receiving fair wages
		Compliance with fair labor standards
		Availability and utilization of healthcare benefits
	Community Impact	Investment in community development projects
		Contributions to local education initiatives
		Support for healthcare programs in local communities
	Diversity and Inclusion	Diversity statistics in the workforce
		Gender equality initiatives
		Inclusive hiring practices
	Health and Safety	Adherence to safety protocols in coffee production
		Frequency of health check-ups for workers
		Availability and use of personal protective equipment
	Workers' Rights	Awareness levels of workers' rights
		Existence of grievance mechanisms for workers:
		Accessibility and effectiveness of communication channels for workers
	Community Engagement	Frequency and scope of community forums and consultations
		Collaboration in community projects and initiatives
		Financial contributions to community development

Economic	Economic Impact on Producers	Income of Coffee Farmers
		Access to Market Information:
		Profitability of Coffee Farming
	Value Chain Distribution	Fair Distribution of Profits
		Economic Benefits for Intermediaries
		Financial Transparency
	Market Access and Pricing	Market Access Initiatives
		Pricing Mechanisms
		Impact of Market Fluctuations
	Economic Resilience Strategies	Diversification of Income Sources
		Adaptation to Market Trends
		Investment in Technological Solutions
	Market Access Initiatives	Certifications and Quality Standards
		Market Development Programs
		Collaboration with Retailers
	Financial Impact of Sustainable Practices	Costs and Benefits of Sustainable Practices
		Return on Investment in Sustainability
		Access to Sustainable Markets
Environmental	Sustainable Farming Practices	Organic Farming Certification
		Water Conservation Measures
		Biodiversity Preservation
	Waste Management	Coffee Pulp Utilization
		Recycling Initiatives
		Reduction of Single-Use Plastics

	Carbon Footprint	Carbon Emission Reduction Initiatives
		Transportation Efficiency
		Energy Consumption Reduction
	Resource Efficiency	Water Usage Efficiency
		Energy-Saving Practices
		Land Management for Sustainability
	Conservation of Biodiversity	Agroforestry Practices
		Wildlife Habitat Preservation
		Use of Shade-Grown Coffee
	Unutilized Coffee Waste	Disposal Practices for Unutilized Coffee
		Repurposing Unutilized Coffee
		Reduction of Unutilized Coffee Waste

Appendix F

This appendix provides supplementary figures intended to enhance accessibility and interpretability of the DigiCircular framework and its empirical applications. The figures presented here offer high-level conceptual and synthesis views that complement, the detailed methodological descriptions, dashboards, and quantitative analyses discussed in the main body of the thesis.

Figure A1 provides a high-level conceptual representation of the DigiCircular Twin-Transition framework, intended to support non-specialist understanding without replacing the detailed methodological architecture presented in Chapter 3.

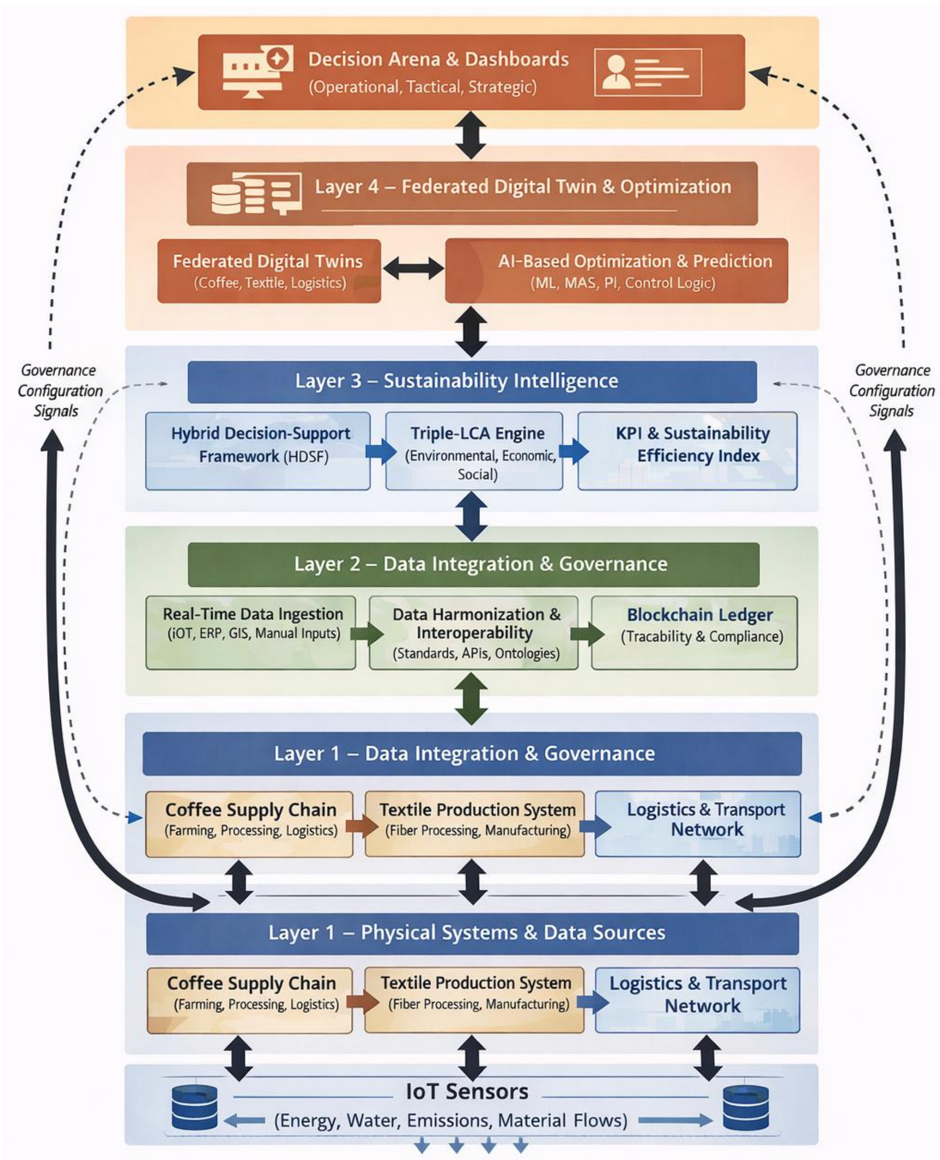

Figure A1. Simplified Conceptual Overview of the DigiCircular Twin-Transition (DT^2)

Figure A2 summarizes key sustainability performance indicators for the coffee case study, providing an aggregated visualization complementary to the detailed dashboards discussed in Chapter 4.

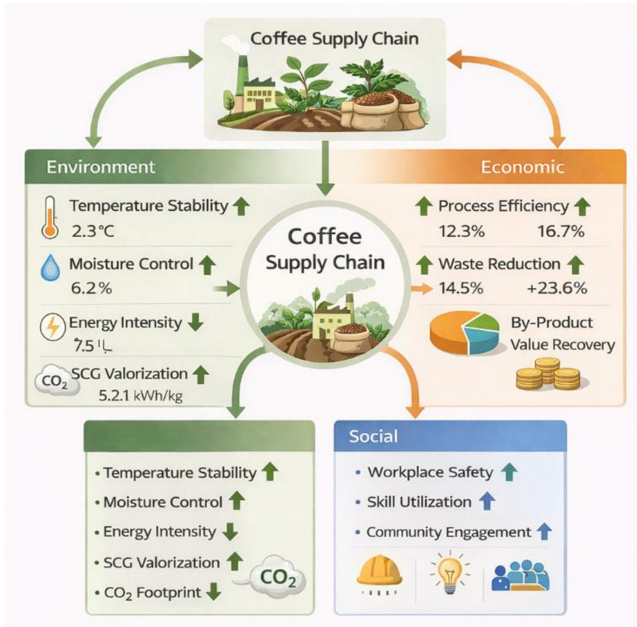

Figure A2. Summary Sustainability Dashboard for Coffee Case Study

Figure A3 presents a consolidated sustainability dashboard for the textile case study, offering an accessible overview of performance improvements derived from the DigiCircular implementation.

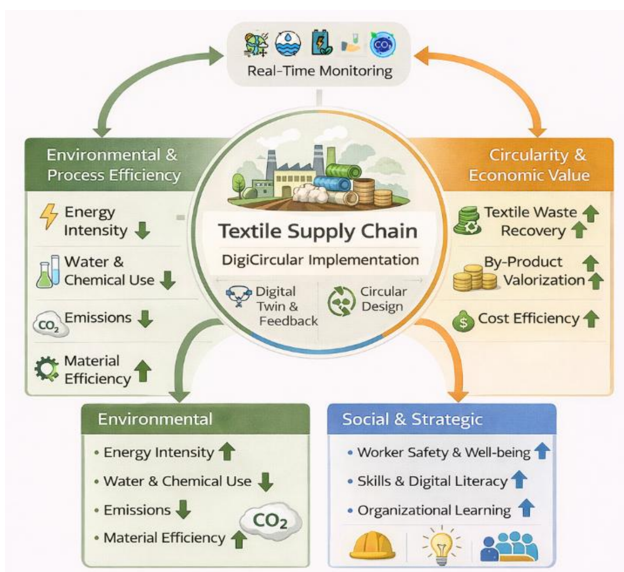

Figure A3. Summary Sustainability Dashboard for Textile Case Study