

# How do international sanctions affect the adoption of sustainability practices?

## a qualitative research in Iran’s steel supply chain

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CHALLENGES AND RESILIENCE OF

GLOBAL SUPPLY AND VALUE CHAINS





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### Introduction & Context

**The steel supply chains: global importance**

- Backbone of global development: construction, energy, manufacturing, transport.
- Responsible for ~7–9% of global CO<sub>2</sub> emissions and high resource intensity (energy, water, and raw materials).
- Global steel output ≈ 1.9 billion tonnes/year; demand continues to rise with urbanization.
- Sustainability transformation is a **strategic global priority** (EU Green Deal, Net-Zero 2050, ESG integration).

**Why sustainability matters in steel supply chains**

- Sustainability performance depends on coordination across **mining** → **production** → **logistics** → **recycling**.
- **Institutional alignment** (policy, standards, collaboration) is essential for emission reduction and circularity.
- Institutional theory shows that firms adopt sustainability practices through:
  - **Coercive pressures:** regulation and policy enforcement
  - **Normative pressures:** professional norms, certification, shared values
  - **Mimetic pressures:** learning and imitation of successful peers

### Research Gap/Problem

**Problem (observed):**

Sustainability in industrial supply chains is uneven and inconsistent in sanctioned economies despite policy discourse and firm-level intent.

**What we know:**

Research in sustainable supply chain management shows that institutional pressures generally promote sustainability adoption.

**Observation:**

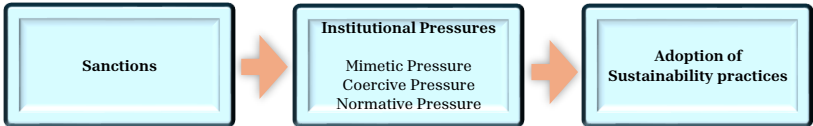
Under sanctions and political isolation, these institutional mechanisms appear to behave differently, and their influence on sustainability adoption becomes uncertain.

**Research gap:**

Sustainable supply chain research has not yet explained how institutional pressures operate and interact under sanctions and what this means for the pursuit of sustainability in industrial supply chains.

### Research Question: How do international sanctions affect the adoption and development of sustainability practices in industrial supply chains?

### Framework and Method



**Method:** qualitative research approach

**Data Collection:**

- **Primary:** Semi-structured interviews with 18 experts
- Two discussion meetings 2024 and 2025
- **Secondary:** Annual reports, sustainability reports, and company websites.

**Thematic analysis** was conducted to identify major themes, using inductive coding (emerging insights)

Company Name	Role in Steel Supply Chain	Interviewees Profile	Interview Duration (min)	Interview Type
Sijaliran Steel Company (SISCO)	Vertically integrated producer (mining to end-user distribution)	Four senior professionals from HSE and systems development departments	20	1 person In-person
Zarand Iranian Steel Company (ZISCO)	Fully integrated steel manufacturing and distribution firm	Two department heads specializing in HSE and corporate social responsibility	80	1 person In-person
Gohar Zamin Iron Ore Company	Midstream operator (mining to pelletizing)	One senior environmental compliance officer	0	6 ne Onli
Shohada Sanat Pajoue	Downstream manufacturer (structural steel components)	Two senior plant-level managers in operations and HSE	0	9 person In-person
Hamradko Lime and Dolomite Production Company	Upstream raw material processor (lime and dolomite)	One technical expert in health, safety, and environmental compliance	0	6 ne Onli
Ahan Online	Steel wholesaler and distributor	Executive-level participant: Deputy CEO and Board Member	0	4 person In-person
Kerman Department of Environment	Regulatory authority (environmental oversight)	Two personnel: unit manager and environmental compliance specialists	20	1 person In-person
Kerman Province Mining Industry and Trade Organization	Governmental oversight of mining and industrial trade	Four senior regulators involved in industry monitoring and compliance	20	1 person In-person
Jahan Tejarat Company	NGO promoting sustainable steel markets	Chief Executive Officer with expertise in sustainable development and advocacy	0	6 ne Onli

### Findings

**U.S. Sanctions on Iran’s Steel Supply Chain (2018–2021)**

- ♦ **May 2018 – JCPOA Withdrawal**
- U.S. reimposes sanctions on **graphite, steel, aluminum, and metals trade**.
- Disrupts **raw material imports** (esp. graphite electrodes) and steel production.
- ♦ **Aug–Nov 2018 – Reinstated JCPOA Sanctions**
- Bans trade, shipping, insurance, and finance for Iran’s **metals sector**.
- Limits access to foreign equipment and export markets.
- ♦ **May 2019 – Executive Order on Metals**
- Targets **iron, steel, aluminum, copper** (≈10% of Iran’s export revenue).
- Prohibits foreign deals with Iranian metal exporters.
- ♦ **Jan 2020 – Major Steel Producers Sanctioned**
- **17 key firms** (e.g., Mobarakeh, Khuzestan, Hormozgan, Esfahan, Golgohar) added to **OFAC list**.
- **Blocks export and financing networks**.
- ♦ **Jul 2020 – Foreign Partners Targeted**
- **8 companies** (4 Iranian + 4 foreign in UAE, Germany, Hong Kong) sanctioned for links with **Mobarakeh Steel**.
- ♦ **Jan 2021 – Final Trump-Era Round**
- **17 companies + 1 individual** sanctioned, including **12 Iranian steel producers** and a **China-based graphite supplier**.
- Expands to **entire supply chain** (inputs–exports)

**Impact of sanctions on sustainability across Iran’s steel supply chain**

Supply Chain Stage	Market Impacts	Policy / Regulatory Impacts	Financial Impacts	Technological Impacts	Operational Impacts
<b>1 Raw Material Extraction &amp; Mining</b>	Decline in export diversification; dependency on a few high-risk regional buyers undermines bargaining power. (P5-23, P2-21)	Pollution limits shift with sanction cycles, making targets unreliable; environmental fines fluctuate with FX rate. (P2-9, P2-18)	Foreign finance blocked; over-reliance on short-term internal liquidity; high-interest loans (>25%) make long-term sustainability projects unviable. (P4-38, P5-63, P3-19)	Shifting sanction lists block import of scrubbers and monitoring systems. (P1-15)	Equipment depreciation and deferred maintenance increase energy use; spare-parts hoarding for furnaces. (P2-29)
<b>2 Transport &amp; Logistics</b>	Port refusals and shipping sanctions raise freight costs, dismantling circular flows (scrap, alloys). (P5-85)	Weak and inconsistent enforcement of logistics standards; absence of coherent environmental transport regulation. (P2-9)	Letters of credit refused; high risk-premium freight and insurance. (P5-71)	Lack of tracking and MRV tools for logistics due to blocked software imports. (no code)	Reliance on small Gulf intermediaries adds cost and unreliability; fragmented routing chains. (P5-85)
<b>3 Production &amp; Energy</b>	Green-steel contracts collapse amid price volatility and buyer withdrawal. (P4-41, P5-61)	Abrupt withdrawal of subsidies and “green” loans due to political shifts; inconsistent enforcement of pollution standards. (P2-4, P2-9)	Exchange-rate swings delay EAF upgrades and decarbonization projects. (P2-12)	Substitution with lower-tier Chinese technology and control systems; standards-arbitrage at lower efficiency. (P3-222, P5-68, P5-74)	Deferred maintenance, lower utilization, and semi-finished goods hoarding to buffer volatility. (P1-13, P2-29)
<b>4 Market &amp; Export (Sales, Customers)</b>	Loss of EU markets; shift to semi-finished exports (billets/slabs). (P4-41, P5-61)	Misalignment with ISO/GRI due to isolation from global standard-setting. (P3-63, P2-9)	Capital cost barriers, refusal of international financing, risk premiums on trade deals. (P5-71)	Knowledge isolation blocks participation in ISO/UNEP dialogues; inability to meet LCA benchmarks. (P3-63, P8-87)	Increased dependence on brokers and ad-hoc contracts; short-termism replaces planned sustainability. (P4-41, P5-61)
<b>5 Recycling, Waste &amp; Circularity</b>	Scrap-price instability discourages infrastructure investment; opportunistic recycling only during price spikes. (P3-44)	Lack of ISO participation creates domestic–international metric divergence. (P3-63)	No green-finance mechanisms for circular initiatives; collateral requirements exclude small mills. (P3-19, P5-63)	Equipment access challenges delay EAF and WHR system upgrades. (P5-69)	Scrap-supply uncertainty and hoarding of billets/spares disrupt circular flows and raise waste. (P2-29, P1-13)

### Institutional pressures on sustainability under sanctions

Dimension	Coercive Pressures	Normative Pressures	Mimetic Pressures
<b>Behavior under sanctions</b>	Fragmented and volatile; regulation becomes reactive, short-term, and decoupled from global norms.	Severely weakened; moral and professional obligations lose collective anchors.	Distorted and redirected toward survival-oriented or low-standard models.
<b>Mechanism of distortion / adaptation</b>	<ul style="list-style-type: none"><li>• Rapid policy flip-flops and sanction-cycle regulation (P2-9, P2-4)</li><li>• Volatile environmental fines pegged to the FX rate (P2-18)</li><li>• Abrupt withdrawal of “green” loans; punitive credit terms (P4-38, P5-63)</li><li>• Sanction lists blocking import of mandated abatement technology (P1-15, P5-69)</li></ul>	<ul style="list-style-type: none"><li>• ISO 14001/GRI auditors barred; foreign certifiers absent (P3-63)</li><li>• Visa bans cut university–industry and NGO links (P8-85, P8-87)</li><li>• Inflation makes conference dues and travel unaffordable (P8-87)</li><li>• Loss of peer learning and standard-setting dialogues (P3-63, P8-87)</li></ul>	<ul style="list-style-type: none"><li>• “Moving-target” exemplars: partner shifts EU→Turkey→China (P3-222, P5-68, P5-74)</li><li>• Fragmented benchmarking under inflation and secrecy (P5-85)</li><li>• Price-swing uncertainty undermines green-steel exemplar contracts (P4-41, P5-61)</li><li>• Technology imitation limited to accessible (often outdated) systems (P5-68, P5-74)</li></ul>
<b>Outcome for sustainability</b>	→ Institutional volatility erodes predictability and legitimacy.→ Firms comply symbolically (“adaptive decoupling”) while prioritizing survival.→ Long-term investment confidence collapses; sustainability rules lose coercive force.	→ Normative isolation; firms act without external validation.→ Domestic substitutes for ISO/GRI emerge but diverge from global norms (“localized legitimacy”).→ Professional learning collapses, creating “knowledge silence” and uneven sustainability practices.	→ Mimetic inversion: instead of copying best practice, firms imitate accessible models.→ “Standards-arbitrage” toward lower-tier Chinese technology.→ Benchmarking shifts from environmental excellence to mere operational continuity.