



SONGKHLA PROVINCIAL
PUBLIC BENEFIT
ORGANIZATION
FOR QUALITY OF LIFE DEVELOPMENT

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Thai Journal of National Interest

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Editorial

Evidence, Interpretation, and Continuity Across Economic and Educational Systems

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This issue of the *Thai Journal of National Interest* (TNI) brings together contributions on Russian oil exports under sanctions, productive transitions in advanced manufacturing, and the educational interpretation of art within a Christian framework. Across these different subjects, the articles examine how observed outcomes relate to underlying processes and what the available evidence permits scholars to conclude. Their shared concern is the development of arguments that make their analytical foundations and limitations explicit.

“Continuity under Sanctions: Transactional Reconfiguration and the Reproduction of Russian Oil Exports” examines why restrictions that raise transport, insurance, financial, and market-access costs do not necessarily interrupt an energy-export system. The article distinguishes operational pressure, value compression, and functional interruption. It develops the concept of transactional reconfiguration to explain how operational rights, accessible assets, guarantees, counterparties, jurisdictions, and settlement arrangements can be recombined to reproduce constrained functions within the available adjustment interval. Its analysis presents continuity as state-enabled and relationally co-produced through coordination within Russia and acceptance by

external participants. This perspective directs attention to the conditions under which disruption at particular nodes becomes sustained interruption of the broader export circuit.

“From Productive Transitions to Capability Accumulation: Evidence from Advanced Manufacturing in Thailand and Vietnam” investigates what documentary evidence can establish about the retention and subsequent use of productive resources. Through a comparative longitudinal analysis of selected manufacturing episodes, the article distinguishes production presence, productive transition, capability accumulation, and cumulative productive transformation. It finds that the examined sources do not sufficiently establish the connections between distinct episodes needed to substantiate accumulation. This is an evidentiary limit, rather than a finding that accumulation did not occur. The contribution offers a disciplined approach to evaluating industrial upgrading claims while avoiding the assumption that differences in public disclosure necessarily indicate differences in capability.

The academic article “Spiritual Art in Soteriological Education” considers how selected works from mythology, painting, and film can support reflection within a Christian educational framework. It distinguishes explicitly sacred subject matter, documented artistic intentions, and theological meanings introduced by an interpreter. The proposed classroom procedure connects observation and contextual understanding with supported interpretation, comparison, and reflection. Particular attention is given to educational settings involving different beliefs, where understanding a Christian perspective should allow questioning without requiring religious affirmation. The article presents an interpretive and pedagogical proposal whose educational effects remain open to subsequent evaluation.

Together, these contributions demonstrate the value of identifying the processes behind observed outcomes and matching conclusions to the evidence supporting them. They also show how conceptual clarification can inform policy and practice while preserving distinctions between documented developments, analytical interpretations, and proposals requiring further examination.

The editorial team thanks the authors, reviewers, and readers for their contributions to the journal's scholarly exchange. We hope this issue encourages further discussion across political economy, industrial development, and education, grounded in careful analysis and openness to critical examination.

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Continuity under Sanctions: Transactional Reconfiguration and the Reproduction of Russian Oil Exports

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Abstract

Why do sanctions that increase transport, insurance, financial, and market-access costs not necessarily interrupt an energy-export system? Conventional indicators such as prices, revenues, and trade volumes identify economic damage but do not explain whether a constrained material-commercial function can be reproduced.

This article distinguishes operational pressure, value compression, and functional interruption and examines Russian petroleum exports from December 2022 to 20 September 2026. Using structured event-configuration analysis, it traces constraint-response episodes affecting the recurring circuit of extraction, loading, transport, delivery, settlement, and renewed shipment. It develops the concept of **transactional reconfiguration**: the timely recombination of

operational rights, accessible assets, guarantees, counterparties, jurisdictions, and settlement arrangements through which a constrained function is reproduced. Fiscal receipts are treated as downstream evidence of monetisation rather than as direct measures of physical continuity. The evidence demonstrates substantial operational pressure, periods of value compression, and interruption at particular nodes and corridors, but not sustained interruption of the aggregate export circuit. Continuity was state-enabled but relationally co-produced through Russian coordination and external acceptance by buyers, ports, insurers, banks, and intermediary jurisdictions. Node removal becomes system-level interruption only when no operationally sufficient substitute is constituted before the viable adjustment interval expires.

Keywords: Economic Sanctions; Russian Petroleum Exports; Transactional Reconfiguration; Material-Commercial Reproduction; State Capability; Functional Interruption

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1. Introduction

Sanctions against Russian petroleum intervene at different stages through which production becomes an internationally delivered and monetised export. Import prohibitions remove destination markets; vessel and service restrictions constrain transaction capacity; and the G7 price cap conditions access to coalition maritime services on compliance with specified price

thresholds (U.S. Department of the Treasury, 2022, 2023). EU measures separately restrict imports and services associated with Russian crude oil and petroleum products (Council of the European Union, 2026a).

Assessments commonly examine prices, export earnings, fiscal receipts, production, or economic growth. These indicators identify damage but do not necessarily establish whether the export function has ceased. Building on the distinction between imposed costs and achievement of political objectives (Baldwin, 1985; Drezner, 1999; Pape, 1997), this article differentiates **operational pressure**, **value compression**, and **functional interruption**. Pressure increases the cost, risk, complexity, or duration of operation; compression reduces the usable commercial or fiscal value generated by continuing circulation; interruption occurs when an indispensable function cannot be completed or replaced within its viable interval.

The explanatory problem lies between restriction of a component and interruption of its function. Weaponised-interdependence research shows how control over central financial and infrastructural nodes enables monitoring and exclusion (Farrell & Newman, 2019). Research on circumvention documents migration through third countries and alternative commercial channels (Andreas, 2005; Early, 2015), while supply-chain research explains substitution, redundancy, inventories, and rerouting (Christopher & Peck, 2004; Sheffi, 2005; Tang, 2006). Yet neither component removal nor changed destinations explain how an alternative transaction becomes executable and repeatable. Continued petroleum circulation requires vessels, operational rights,

liability arrangements, port acceptance, buyers, contracts, and settlement channels to become jointly usable in the required sequence.

Russian adaptation also occurred within a material constraint facing sanctioning and importing states. Replacing Russian petroleum requires more than nominal production elsewhere. Alternative supply must be commercially available in sufficient volume and compatible grades, supported by usable transport, insurance, finance, and terminals, and delivered within the importer's operating interval. Rapid exclusion may therefore reduce Russian revenue while tightening global supply and raising adjustment costs for importing economies. The price cap explicitly reflected this tension by seeking to reduce Russian earnings while maintaining petroleum supply to the world market (U.S. Department of the Treasury, 2022, 2023).

This article conceptualises the resulting adaptation as **transactional reconfiguration**: the timely recombination of actors, accessible assets, effective operational rights, guarantees, jurisdictions, and settlement arrangements into an externally accepted and repeatable configuration after an established protocol becomes unusable. The concept is broader than sanctions evasion because it includes circumvention as well as lawful substitution beyond coalition-controlled services.

Transactional reconfiguration also reframes state capability. Russia did not need to own every asset in the export chain. It needed to help make heterogeneous public, private, domestic, and foreign resources operational in the required sequence. Because reconstructed arrangements

became executable only when buyers, ports, insurers, banks, registries, and intermediary jurisdictions accepted them, continuity was state-enabled but relationally co-produced.

The article asks:

How did Russia and participating external actors reconstruct the operational rights, assets, guarantees, relationships, and settlement arrangements required to reproduce petroleum-export flows across successive cycles under sanctions?

It also examines how reconstructed configurations redistributed costs, risks, and adjustment time among Russia, commercial counterparties, and importing economies.

The central argument is that sanctions produce sustained system-level interruption only when effective capacity is removed faster than replacement becomes operational and the resulting deficit persists beyond the circuit's logistical, commercial, and financial buffers. Where alternative vessels, liability arrangements, buyers, ports, contracts, and settlement channels become usable in time, sanctions may impose substantial pressure and compress value without terminating the aggregate export function.

The article makes three contributions. First, it shifts analysis from the removal of individual nodes to the reproduction of functions across successive cycles. Second, it develops transactional reconfiguration to explain how a constrained function migrates to another operational protocol. Third, it identifies the relational and unequal distribution of the costs, risks, and adjustment time required to preserve continuity.

2. Literature and Explanatory Gap

2.1 Four Partially Connected Literatures

Four bodies of literature illuminate different parts of petroleum circulation under sanctions but begin from different analytical objects.

Table 1

Contributions and Analytical Limitations of Four Literatures on Petroleum Circulation under
Sanctions

Literature	Principal contribution	Remaining limitation
Sanctions and network power	Explains economic coercion and how control over central financial, technological, and logistical nodes creates leverage (Baldwin, 1985; Drezner, 1999; Hufbauer et al., 2007; Pape, 1997; Farrell & Newman, 2019)	Gives less attention to whether a constrained function can migrate to another configuration
Trade diversion and circumvention	Documents changes in destinations, intermediaries, ownership, currencies, and transaction channels (Andreas, 2005; Early, 2015; Babina et al., 2023; Johnson et al., 2023; Cardoso et al., 2025)	Identifies where trade moved without fully explaining how the alternative transaction became executable and repeatable
Supply-chain resilience	Explains routing, inventories, redundancy, substitution, and recovery from disruption	Often assumes that replacement assets remain commercially

Literature	Principal contribution	Remaining limitation
	(Christopher & Peck, 2004; Sheffi, 2005; Tang, 2006)	accessible, whereas sanctions make access legally and politically contested
State capacity	Explains coordination, infrastructural power, institutional change, revenue extraction, and resource mobilisation (Mann, 1984; Levi, 1988; Besley & Persson, 2011)	Often treats taxable activity as an existing base rather than explaining how the underlying circulation is reconstructed

Note. The authors' synthesis of the cited literature.

Research on Russian petroleum sanctions demonstrates both substantial costs and extensive adaptation. Russian crude was redirected from Europe toward China, India, Türkiye, and other destinations, while discounts, enforcement, leakage, and the expansion of tanker capacity outside coalition services shaped the results (Babina et al., 2023; Johnson et al., 2023; Cardoso et al., 2025). These findings establish trade diversion and changing costs but leave unresolved when damage to particular transaction components becomes interruption of the underlying export function.

The gap arises from a mismatch between the unit targeted and the function expected to disappear. Sanctions apply to identifiable firms, vessels, banks, insurers, technologies, traders, and buyers. Petroleum exports, however, are produced through relations among cargo rights, loading capacity, transport, liability coverage, ports, contracts, buyers, and settlement institutions. Restricting one component does not necessarily remove its function when another operational configuration can perform it.

Physical existence also differs from operational availability. A tanker may exist but remain inaccessible; insurance may be issued but rejected by a destination port; and a willing buyer may lack an acceptable settlement channel. These elements must become jointly usable in the correct sequence (Suwan-achariya, 2026). Replacement completed after production, storage, contractual, delivery, or liquidity limits have become binding cannot prevent an interruption already incurred.

2.2 Transactional Reconfiguration and Material-Commercial Reproduction

This article conceptualises the missing process as **transactional reconfiguration**: the timely recombination of operational rights, accessible assets, actors, guarantees, jurisdictions, and transaction protocols into an executable configuration after an established arrangement has been constrained.

Transactional reconfiguration differs from rerouting. Rerouting changes the path of an existing flow; transactional reconfiguration changes the institutional conditions under which that flow becomes possible. It may require simultaneous changes in vessel access, liability coverage, contractual counterparties, port acceptance, currency, settlement, jurisdiction, and risk allocation.

These conditions are conjunctural. Additional tanker capacity cannot compensate for the absence of port acceptance, while a new currency cannot reproduce settlement without an accessible bank and usable conversion arrangement. The relevant question is therefore whether enforcement removes an indispensable function faster and for longer than the targeted system and its counterparties can reconstruct it.

The higher-order outcome is **material-commercial reproduction**: the capacity to constitute the conditions of movement and monetisation repeatedly so that completion of one cycle permits another to begin. The vessels, insurers, buyers, banks, or jurisdictions may change; what must persist is the capacity to perform the critical function before the viable adjustment interval expires.

This process cannot be constituted by Russia alone. Importing states, ports, refiners, insurers, traders, banks, registries, and public authorities participate by accepting alternative documentation, guarantees, contracts, currencies, and distributions of risk. Transactional reconfiguration is therefore state-enabled, externally accepted, and relationally co-produced. The remaining analytical task is to determine when this reconstructed configuration becomes operational and repeatable, rather than merely announced or nominally available.

3. Conceptual Framework

3.1 Material-Commercial Reproduction and Effective Rights

The object of explanation is the recurring circuit through which extracted petroleum becomes a delivered and monetised export:

extraction → loading → transport → delivery → settlement → renewed shipment

The empirical unit of analysis is the **constraint-response episode** specified in Section 4. Each episode assesses whether a restriction altered or interrupted a function within this circuit.

Continuity exists when the circuit can be completed and initiated again within the relevant operational interval. Vessels, buyers, insurers, ports, currencies, and routes may change without destroying the function. **Material-commercial reproduction** occurs when completion of one

cycle preserves or reconstructs the conditions required to initiate another. A single shipment demonstrates movement; a subsequent completed cycle supported by operational replacement and monetisation capacity demonstrates reproduction.

The circuit contains three connected layers. **Material circulation** comprises extraction, loading, transport, and delivery. **Commercial monetisation** converts delivery into a usable claim or payment. **Fiscal capture** transfers part of that value to the state. Fiscal receipts therefore provide downstream corroboration that some petroleum activity generated monetisable and taxable value, but they neither measure physical continuity directly nor prove settlement of a particular cargo.

Reproduction requires an operational configuration rather than the nominal existence of individual components. Formal ownership is neither necessary nor sufficient: an owned tanker may remain unusable without a deployable charter, accepted insurance, port access, cargo authority, and settlement, while a foreign-owned vessel may become effective capacity through contractual access and external acceptance.

Drawing on property-rights research (Barzel, 1997; Schlager & Ostrom, 1992), **temporally effective operational rights** are legally, commercially, and politically usable rights over an asset or transaction that are accepted by the required counterparties and activated within the time available for reproduction. Registration, flag, charter, insurance, liability, port acceptance, contractual jurisdiction, and payment authority may be distributed across several actors and jurisdictions.

Let $\square_\square$ denote the time required to secure effective rights and deploy replacement capacity, and $\square_\square$ the time remaining before storage, production, contractual, delivery, or liquidity constraints make the function non-viable. Timely reproduction requires:

$$\square_\square < \square_\square$$

Capacity activated after $\square_\square$ may restore later activity but cannot prevent the interruption already incurred. This inequality is a process-tracing diagnostic rather than a precisely measured production function.

3.2 Pressure, Compression, and Interruption

Sanctions effects are classified according to their consequences for the material-commercial circuit:

Table 2

Classification of Sanctions Effects on the Material-Commercial Circuit

Outcome	Diagnostic meaning	Indicative evidence
Operational pressure	The function continues but becomes more costly, risky, delayed, or institutionally difficult	Longer routes, higher transaction costs, delays, or additional intermediation
Value compression	Circulation continues but produces less usable commercial or fiscal value	Lower netbacks, export earnings, taxable value, or attributable fiscal receipts

Outcome	Diagnostic meaning	Indicative evidence
Functional interruption	An indispensable function cannot be completed or replaced within its viable interval	Failure to load, transport, deliver, settle, or initiate another cycle

Note. Developed by the authors.

These outcomes may coexist across nodes, periods, or scales. Higher transport costs establish pressure but demonstrate compression only when they reduce net usable value. Similarly, lower fiscal receipts neither establish interruption nor demonstrate a sanctions effect without distinguishing changes in prices, exchange rates, production, taxation, and other causes.

Scale must also be specified. A designation may interrupt one vessel or transaction while aggregate carrying capacity remains reproducible. System-level interruption occurs only when an indispensable function cannot be replaced at the scale and within the time required to sustain aggregate operation. Reproducibility therefore does not imply complete resilience: circulation may continue while becoming more costly, concentrated, opaque, or politically vulnerable.

3.3 The Replacement Race

The transition from pressure to interruption depends on the relationship between **effective capacity removal** and **operational replacement**. Removal occurs when enforcement makes previously usable capacity unavailable, not merely when an entity is designated. Replacement occurs when an alternative asset, right, guarantee, or relationship becomes deployable within an accepted transaction configuration, not merely when it is announced or acquired.

The central proposition is:

Sustained interruption becomes likely when enforcement removes effective capacity faster than replacement becomes operational and the resulting deficit persists beyond the circuit's buffers and viable adjustment interval.

A temporary deficit is insufficient to establish interruption. Inventories, spare assets, storage, fiscal reserves, contractual flexibility, delayed delivery, and public guarantees may extend adjustment time. These buffers temporarily preserve operation but do not reproduce the missing function.

Replacement capacity is relationally produced. A vessel, insurer, buyer, or settlement channel becomes effective only when the necessary registries, ports, banks, counterparties, and authorities accept the reconstructed arrangement. The decisive question is whether an operationally sufficient and externally accepted configuration becomes usable before the circuit's buffers or viable interval are exhausted.

4. Research Design

4.1 Strategy, Scope, and Unit of Analysis

The study employs qualitative **structured event-configuration analysis**, combining process tracing, structured comparison, and configurational analysis (Beach & Pedersen, 2019; George & Bennett, 2005; Ragin, 2008). It does not estimate an average sanctions effect or combine heterogeneous measures into an intensity index. Restrictions on vessels, insurance, finance, ports, buyers, and technology affect different functions through different mechanisms and temporal sequences.

The analysis instead reconstructs **constraint-response episodes**. Each episode begins with an implemented restriction affecting an identifiable function and traces effective capacity removal, operational responses, external acceptance, and subsequent reproduction or interruption. The approach is structured because common questions are applied to each episode; event-based because restriction, response, activation, and subsequent operation are ordered chronologically; and configurational because outcomes depend on combinations of rights, assets, guarantees, counterparties, and permissions.

The principal case is Russian seaborne crude-oil exports, supplemented by petroleum-product episodes where sufficiently detailed evidence is available. The observation period extends from the implementation of the EU embargo and G7 crude-oil price cap in December 2022 to 20 September 2026. Earlier evidence establishes the pre-restriction configuration, while measures announced before December 2022 are included only when they affected transactions during the observation period.

The empirical unit of analysis is the **constraint-response episode**; the recurring material-commercial circuit is the object whose reproduction each episode assesses. Measures implemented together and affecting the same configuration are treated as a linked episode. Distinct functions affected through different mechanisms are traced separately. Episodes are retained whether substitution succeeds, fails, is delayed, or remains indeterminate.

4.2 Event Selection and Evidence

Events are selected purposively when verifiable evidence indicates that they either constrained a function required for petroleum circulation or created or activated an alternative arrangement for transport, insurance, contracting, guarantees, settlement, or cargo disposition. Selection is based on operational relevance rather than observed success. A response is not classified as replacement merely because it followed a restriction; evidence must connect it temporally and functionally to the capacity constrained.

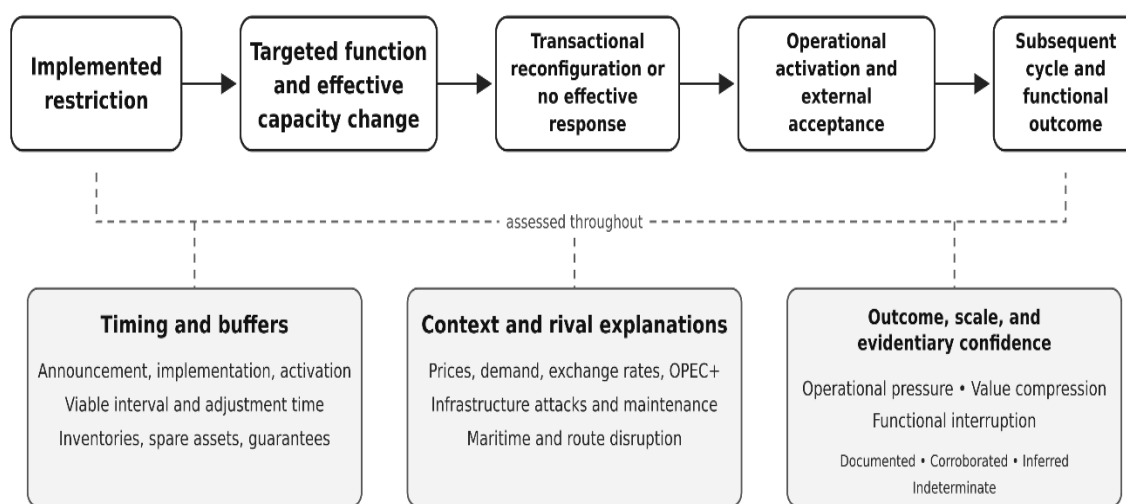
External shocks—including OPEC+ decisions, exchange-rate movements, demand changes, infrastructure attacks, and maritime disruption—are coded as contextual events when they affect prices, routes, replacement capacity, or incentives to accept alternative arrangements. They are not treated as sanctions unless they directly restrict Russian transactions. Technology measures expected to affect production only beyond the observation period are classified as prospective constraints.

Evidence combines legal and regulatory documents; government and intergovernmental data; shipping, customs, port, and commodity information; corporate and institutional records; and reputable specialist reporting. Legal documents establish the scope and timing of restrictions, while operational records are required to assess loading, transport, port entry, discharge, settlement, and repeated use.

Claims are classified as documented observations, corroborated reports, reported estimates, analytical inferences, or unresolved. The classification applies to individual claims

rather than entire sources. An official measure may establish legal scope without proving operational removal, while vessel movement may establish delivery without revealing ownership, insurance, or payment. Public silence is therefore treated as indeterminate unless the missing trace would normally be observable and its absence has substantive meaning.

4.3 Episode Coding and Outcome Inference



Assessment proceeds by function, period, and scale: component, corridor, and aggregate circuit.

Figure 1. Structured Event-Configuration Analysis of a Constraint-Response Episode.

Note. Constructed by the authors.

The figure traces an implemented restriction, changes in effective capacity, transactional reconfiguration or the absence of an effective response, operational activation and external acceptance, and the subsequent functional outcome. Timing, buffers, rival explanations, outcome scale, and evidentiary confidence are assessed throughout.

Each episode records the targeted function; the authority and timing of the restriction; the pre-existing configuration; effective capacity removed or otherwise affected; the observed response; external acceptance; subsequent flow, settlement, and initiation of another cycle; the functional outcome; rival explanations; and evidentiary confidence.

Legal designation is treated as an intervention rather than an operational outcome. A designated tanker represents removed capacity only when previously usable carriage becomes unavailable. Likewise, the acquisition or authorisation of a substitute does not establish replacement until it is deployed and accepted by the counterparties required for operation.

Events within an episode are coded as restriction, reconfiguration, flow, buffer, or context. These categories identify positions within a causal sequence rather than independent observations. Reconfiguration requires functional correspondence with the constrained component, a temporal connection to the restriction, and operational activation. One successful use demonstrates activation; completion of a subsequent cycle demonstrates initial reproduction; and repeated use, or transition to another effective configuration without interruption, supports a finding of sustained reproduction.

Outcomes follow the definitions established in Section 3: operational pressure, value compression, or functional interruption. They are coded by function, period, and scale—component, corridor, or aggregate circuit. Higher transaction costs establish operational pressure but indicate value compression only when evidence demonstrates a reduction in net usable value. Functional interruption is recorded only when an indispensable function cannot be completed or

replaced within its viable interval. Indeterminate is an evidentiary classification, not a fourth substantive outcome.

Where evidence permits, the analysis records the dates of announcement, implementation, and operational replacement. Replacement is timely when it becomes operational before storage, production, contractual, delivery, inventory, or liquidity constraints make the function non-viable. A response completed before implementation is classified as anticipatory reconfiguration only when evidence connects it to an announced or expected restriction. Because the viable interval is rarely observed directly, it is approximated from inventories, operational schedules, contractual deadlines, voyage windows, liquidity requirements, and reported operational urgency.

4.4 Causal Inference and Limitations

A sanctions-related explanation receives strongest support when evidence connects an implemented restriction to loss, delay, withdrawal, or additional cost in a necessary function; identifies a temporally and functionally related response; and establishes the activation, external acceptance, and subsequent performance of any substitute. Where sanctions interact with market or logistical shocks, the analysis permits conjunctural rather than single-cause attribution.

Claims are assessed against disconfirming evidence. Reconfiguration is weakened when substitutes remain undeployed, lack external acceptance, or fail to support subsequent operation. Continuity is weakened by repeated failures of delivery, settlement, or renewed operation, whereas aggregate-interruption claims are weakened when the constrained function is reassigned within its viable interval.

Episodes record observable transaction costs, but incidence is assigned only when contractual, pricing, or fiscal evidence identifies the actor bearing them.

The principal limitations are opaque ownership, chartering, insurance, pricing, and settlement; incomplete vessel information; delayed and multiply determined data; and strategic reporting. Triangulation, confidence classification, and retention of indeterminate cases reduce but cannot eliminate these problems. The study therefore identifies causal sequences and operational conditions rather than average sanctions effects, counterfactual outcomes, or the indefinite durability of reconstructed arrangements.

5. Russia's Response as Distributed Reconfiguration

Russia's response to petroleum sanctions was neither a single countermeasure nor a fully designed replacement system. It emerged through legal intervention, public guarantees, regulatory adaptation, private acquisition and chartering, destination substitution, and participation by third-country firms and authorities. Its strategic character lay in the cumulative direction of these measures rather than implementation of a complete architecture at one moment (Ihoshkina & Suwan-achariya, 2026).

Presidential Decree No. 961 of 27 December 2022 prohibited, from 1 February 2023, petroleum supplies under contracts applying the coalition price-cap mechanism (President of the Russian Federation, 2022). Presidential Decree No. 771 of 11 October 2023 and implementing measures subsequently imposed repatriation and currency-sale requirements on specified exporters (President of the Russian Federation, 2023; Government of the Russian Federation,

2023). Because these requirements were later modified, they are treated as time-bounded interventions rather than permanent features of the reconstructed system.

These measures altered contractual and financial rules but did not themselves supply vessels, insurance, port access, buyers, or settlement capacity. Law could authorise an alternative arrangement and redistribute authority or risk; material continuity depended on whether the necessary assets, services, counterparties, and payments became jointly operational.

Russia therefore did not restore the pre-sanctions network. It sought to reproduce functions previously performed through Western-centred maritime, insurance, financial, and commercial institutions. Existing research documents the redirection of crude toward China, India, and Türkiye and the expansion of tanker capacity operating outside the Western-services regime (Babina et al., 2023; Cardoso et al., 2025). The analysis below examines how these components became connected in repeatable transaction configurations.

5.1 From Legal Countermeasures to Reduced Infrastructural Dependence

Before the principal restrictions, Russian producers controlled petroleum production but relied heavily on G7-centred chartering, protection-and-indemnity insurance, reinsurance, classification, commodity trading, correspondent banking, and destination markets. The price cap conditioned access to coalition maritime and financial services on compliance with specified thresholds, while EU measures restricted imports and associated transport, technical, brokering, and financial services (U.S. Department of the Treasury, 2022, 2023; Council of the European Union, 2026a).

Reconfiguration occurred across complementary functions. Maritime carriage shifted toward purchased, chartered, or managed tankers operating partly or wholly outside coalition services. Russian and third-country insurance, public backing, and alternative guarantees supported liability allocation and selective port acceptance. Alternative traders and buyers redirected cargoes toward Asian and intermediary markets. Non-coalition banks, currencies, and correspondent arrangements facilitated settlement, while repatriation, taxation, and public-support rules connected export proceeds to corporate liquidity and fiscal capture. Cap-compliant, hybrid, and non-coalition transactions consequently coexisted rather than forming a single replacement system.

The evidence does not establish direct Russian state ownership or control of every participating vessel, insurer, trader, or bank. Nor does acquisition alone establish operational capacity. Ownership, insurance, and cargo-level settlement often remain opaque. The stronger finding is that Russian exporters obtained access to heterogeneous public, private, domestic, and foreign resources that were repeatedly connected to the export circuit.

State capability operated through regulation, guarantees, diplomatic engagement, currency rules, infrastructure, and risk absorption. Yet domestic authorisation remained insufficient. Alternative arrangements became operational only when foreign ports, buyers, banks, registries, insurers, and authorities accepted or tolerated them. Reconfiguration was therefore state-enabled but relationally completed across jurisdictions.

Buyer incentives also mattered. Refinery requirements, limited substitutes, or disruption of alternative routes increased the value of deliverable Russian cargoes and the willingness to accept alternative transaction protocols. These incentives did not eliminate sanctions risk; they affected whether bearing that risk was preferable to losing access to supply.

The outcome was reduced dependence on particular coalition-controlled infrastructures rather than autonomy. Russia remained dependent on foreign demand, internationally circulating vessels, ports, repair facilities, maritime passages, payment conversion, and political decisions in intermediary jurisdictions. Reconfiguration relocated dependence and diversified some service channels while increasing concentration in others, particularly destination markets.

5.2 Insurance and Fleet Access as Relational Capacity

Insurance and shipping demonstrate why replacement capacity cannot be measured by domestic institutional creation, vessel ownership, or flag registration alone. A tanker becomes operational only when exporters can access and deploy it and when its registration, documentation, liability coverage, and contractual arrangements are accepted by the authorities and counterparties required for loading, entry, discharge, and reuse.

Western protection-and-indemnity clubs provided more than compensation after an accident. Their coverage was embedded in recognised systems of reinsurance, claims administration, legal enforcement, and port acceptance. Withdrawal of Western P&I therefore constrained an institutional relationship connecting vessels to registries, ports, cargo owners, and buyers.

Russia responded by expanding domestic insurance, reinsurance, and public backing. These measures increased nominal coverage but did not guarantee usability abroad. Effective insurance required a valid policy, credible financial or public backing, accepted documentation, and recognition by the relevant port and buyer. Failure at any indispensable point could leave formally valid coverage operationally ineffective.

India illustrates selective recognition. In May 2025, Indian authorities approved three additional Russian insurers—Sberbank Insurance, Ugoria Insurance Group, and ASTK Insurance Company—to provide marine P&I coverage at Indian ports, bringing the number of recognised Russian providers to eight. The approvals were valid until 20 February 2026 (Verma, 2025). They did not create universal recognition of Russian insurance; they converted specified policies into usable coverage within a major destination jurisdiction for a defined period.

The same logic applies to tanker capacity. The relevant capability is not the number of vessels owned by the Russian state but the carrying capacity that exporters can charter, manage, document, insure or guarantee, load, discharge, and reuse. “Shadow fleet” estimates cannot be treated as directly comparable because they apply different criteria, including non-coalition insurance, opaque ownership, flags of convenience, tracking practices, or prior participation in sanctioned trade.

KSE Institute data nevertheless illustrate the fleet’s heterogeneous structure. In February 2026, 109 unique tankers carried Russian crude oil, of which KSE classified 72 per cent as shadow-fleet vessels. A further 174 tankers carried petroleum products, with 37 per cent classified

in the same category. The Russian flag's share of shadow-fleet transport volume rose from 3 per cent in May 2025 to 21 per cent in February 2026, while foreign flags remained significant. KSE also identified at least 33 shadow-fleet tankers covered by five Russian insurers (KSE Institute, 2026).

These observations indicate growing Russian institutional involvement without demonstrating state ownership or control of the entire operating pool. Foreign-owned or foreign-registered vessels contributed to Russian export capacity where exporters possessed effective contractual access and the necessary ports, insurers, registries, and buyers accepted the arrangement. Conversely, a Russian-owned vessel did not constitute effective capacity if complementary rights or recognition were absent.

Coalition designations and service restrictions reduced vessel choice and raised compliance, insurance, and reorganisation costs. Their system-level effect, however, depended on whether designated capacity could be replaced within the shipment interval. Acquisition, chartering, reflagging, management changes, alternative coverage, and destination acceptance formed the countervailing process.

The evidence supports a bounded conclusion: Russian exporters and their partners assembled sufficiently adaptable insurance and tanker arrangements to prevent withdrawal of Western services and vessel designations from producing sustained aggregate interruption during the observed period. This capacity remained costly and externally dependent on second-hand vessel markets, foreign registries, ports, repair facilities, buyers, maritime passages, and

politically contingent recognition. It constituted distributed relational capacity rather than an autonomous Russian fleet and insurance system.

5.3 Hybrid Transactions and Conditional Value Realisation

Reconfiguration did not divide the oil market into autonomous coalition and non-coalition systems. It produced partial institutional bifurcation with a substantial hybrid middle. Some transactions continued to rely principally on coalition shipping, insurance, finance, and price-cap documentation. Others combined alternative insurance, third-country traders, mixed correspondent banking, or reorganised contracts with selected coalition-linked services. A further group operated mainly through non-coalition vessels, insurers, banks, currencies, and contractual arrangements.

These are analytical configurations rather than separate markets or permanent classifications of vessels and firms. Transactions could combine elements from several configurations, while assets and counterparties could move between them as sanctions status, documentation, insurance, prices, and commercial incentives changed. Transactions outside coalition services were also not necessarily unlawful: legal status depended on the actors, services, and jurisdictions involved rather than simply on the use of non-Western vessels, currencies, or banks.

The configurations remained connected through benchmark prices, refinery demand, freight markets, tanker availability, maritime chokepoints, and competition for physical supply. Bifurcation was therefore operational and jurisdictional, not a separation into independent

petroleum markets. It concerned which combination of rights, services, documentation, and external acceptance made a transaction executable.

Sanctions continued to raise freight, compliance, insurance, settlement, and maritime risks. Once alternative protocols became operational, however, their effects increasingly took the form of higher costs, selective capacity removal, and possible value compression rather than automatic exclusion. Compression was not inevitable: increased transaction costs could coexist with higher destination prices when scarcity, route disruption, crude quality, or buyer competition increased the value of deliverable Russian petroleum.

September 2026 price assessments illustrate this conditional outcome. Argus data reported by *Kommersant* assessed ESPO delivered to Shandong at USD 117.11 per barrel in the week ending 13 September, a USD 12.50 premium to ICE Brent futures. Urals delivered to Shandong carried a reported premium of approximately USD 6, while Urals delivered to India carried a premium of approximately USD 2.25 to Dated Brent (*Kommersant*, 2026). Reuters subsequently reported ESPO above USD 120 during volatile mid-September conditions (Reuters, 2026).

These assessments cannot be interpreted as a pure reliability premium. They concern different grades, destinations, dates, delivery bases, and benchmarks. ESPO's quality and comparatively short Kozmino-China route differ from Urals, while delivered prices incorporate freight and destination costs absent from Russian-port free-on-board assessments. The premium therefore reflected an inseparable combination of grade, location, freight, scarcity, delivery timing, transaction risk, and benchmark construction.

The price evidence nevertheless shows that sanctions status alone did not determine commercial value. An operational Kozmino–China corridor gained value when competing supplies and routes became less reliable. Transactional reconfiguration made delivery possible; external scarcity increased the value of that deliverability.

Quantity evidence further demonstrates the unevenness of continuity. Russian seaborne crude exports fell by 12 per cent month on month in August 2026 to approximately 3.84 million barrels per day, although they remained 12 per cent above their August 2025 level. Exports to China increased by 9 per cent from July to approximately 980,000 barrels per day but remained 17 per cent below their year-earlier level (Washington & Griffin, 2026). The aggregate decline demonstrates operational stress, while the increase toward China is consistent with redistribution toward an operational corridor. Neither change can be attributed exclusively to sanctions or treated as proof of deliberate prioritisation.

The evidence therefore supports a bounded interpretation. Reconstructed Russian–Chinese relations continued to deliver crude, and particular grades realised destination premiums under scarcity. These findings do not show that sanctions costs disappeared, that all corridors possessed equivalent capacity, or that the premium measured Russian state capability. They show that sanctions-related costs could be temporarily outweighed at particular destinations by the value of timely access to physical supply.

Price and destination data establish corridor operation and conditional value realisation more directly than aggregate reproducibility. The latter requires combined evidence from repeated shipments, replacement capacity, monetisation, and subsequent operation.

5.4 Principal Finding: Reproduced Function under Pressure

The evidence supports a narrower conclusion than the binary claim that sanctions either “worked” or “failed.” Between December 2022 and 20 September 2026, sanctions constrained vessels, insurers, maritime services, buyers, payment channels, and destination markets. They increased costs, altered routes, narrowed access to recognised services, and periodically compressed commercial and fiscal value, but did not produce sustained interruption of Russia’s aggregate petroleum-export function.

Russian and associated commercial actors preserved substantial export capacity through alternative vessels, insurance or guarantees, port recognition, intermediaries, destinations, contracts, and settlement arrangements. The principal finding is therefore:

Russia maintained a reproducible petroleum-export function because alternative combinations of assets, guarantees, counterparties, and transaction channels became operational rapidly enough to sustain delivery and monetisation across successive cycles.

This is a configurational inference rather than a claim that every transaction stage is observable. Evidence is strongest for loading, transport, destination change, discharge, and repeated route use; settlement remains less transparent. Continuing trade and petroleum-related

fiscal receipts are consistent with aggregate monetisation and fiscal capture but cannot be linked to particular cargoes.

The outcome is best classified as **reproduced continuity under operational pressure and variable value compression**. Continuity was uneven because individual vessels, transactions, and corridors were interrupted while aggregate capacity persisted. It was also relationally co-produced: reconstructed arrangements required acceptance by foreign shipowners, ports, insurers, banks, traders, refiners, and authorities. Reconfiguration relocated rather than eliminated dependence, increasing reliance on concentrated buyers and politically contingent intermediaries. Continued delivery also did not imply unchanged welfare, since higher transaction costs could reduce net value even when volumes persisted.

The resulting structure was a **partially parallel and hybrid export operating system**. Some functions moved outside coalition-controlled institutions, while others remained dependent on foreign demand, circulating vessels, intermediary jurisdictions, and selected Western-linked services.

During the observed period, replacement became operational before capacity losses exhausted the buffers sustaining the aggregate circuit. This conclusion is bounded by scale and time: it demonstrates functional reproduction under observed conditions, not continuity of every transaction or permanent resilience against future restrictions.

6. Discussion: Transactional Reconfiguration and Uneven Continuity

The findings shift attention from sanctioned units to the functions they perform. Removing a vessel, insurer, bank, trader, or buyer does not necessarily eliminate carriage, risk allocation, settlement, intermediation, or purchasing capacity. Component exclusion becomes functional interruption when an operationally sufficient substitute cannot be constituted within the relevant adjustment interval.

In Russia, sanctions increased costs, redistributed risks, altered destinations, and constrained established services without producing sustained aggregate export interruption during the observed period. The outcome depended on enforcement reach, replacement time, buffers, and external acceptance.

6.1 Network Power, Policy Design, and the Replacement Constraint

Energy sanctions pursue different objectives through import prohibitions, entity and vessel designations, and restrictions on maritime and financial services. The G7 price cap explicitly sought to preserve global petroleum supply while reducing Russian revenue. Coalition services remained available for sales at or below the applicable cap under required compliance procedures (U.S. Department of the Treasury, 2022; Van Nostrand & Morris, 2024).

The cap sought to separate material circulation from exporter value capture. Exporters could comply or assemble alternative shipping, insurance, finance, documentation, and contracts. Its leverage depended on alternatives remaining more costly, limited, or unreliable than

compliance. As exporters gained effective access to non-coalition arrangements, transactions became less dependent on covered services, limiting the cap's operational reach.

This qualifies weaponised-interdependence theory. Network centrality enables surveillance, exclusion, and cost imposition (Farrell & Newman, 2019), but durable leverage depends on continued functional indispensability. Centrality within an original configuration does not guarantee control over functions transferable to externally accepted, sufficiently scalable alternatives.

Energy sanctions also face a material replacement constraint. Alternative petroleum must be available in sufficient volumes and compatible grades, supported by usable routes, insurance, and finance, and delivered within importers' operating intervals. Scarcity, incompatible infrastructure, or maritime disruption raises the cost of rejecting Russian supply and encourages acceptance of reconstructed protocols.

Two limits therefore matter: the price cap's deliberate preservation of supply and the structural difficulty of replacing a major supplier without imposing substantial adjustment costs on importers.

Export patterns are consistent with these limits. Russian crude and condensate exports declined from approximately 4.8 million barrels per day in 2024 to 4.3 million in the first half of 2025. Europe's share fell from 51 per cent in 2020 to 12 per cent in 2024, while Asia and Oceania received 81 per cent (U.S. Energy Information Administration, 2025). These figures indicate pressure and geographical reorientation more clearly than removal from global circulation.

Sanctions increased the value of existing alternatives and accelerated their integration, relocating rather than eliminating dependence. The theoretical implication is:

Network-based coercive leverage weakens when a constrained function can be reconstructed outside the controlled network, obtains sufficient external acceptance, and becomes operational before available buffers and adjustment time are exhausted.

Sanctions may still remove assets, impose costs, and compress value, but exclusion becomes less readily convertible into sustained functional interruption.

Transactional reconfiguration extends beyond evasion to include lawful transactions outside coalition jurisdiction, recognised alternative insurance, currencies, guarantees, destinations, and contracts. Functional reproduction, legal compliance, and external acceptance remain separate analytical questions.

Currency substitution likewise need not express ideological de-dollarisation. Firms may switch currencies because established channels cannot execute necessary transactions at acceptable cost and risk. Substitution becomes institutional change when repeated use generates usable liquidity and supports subsequent cycles; de-dollarisation may emerge without being participants' initial objective.

Repeated restrictions may consequently increase the expected cost of network dependence and encourage investment in alternatives. Established systems retain advantages in liquidity, enforceability, expertise, scale, and recognition, while substitutes may remain fragmented, expensive, opaque, or politically vulnerable.

Transactional reconfiguration thus identifies a conditional endogenous limit of network coercion: sanctions can change the structures and incentives on which their leverage depends. That limit becomes operational when externally accepted, sufficiently scalable substitutes become usable before the constrained function's viable interval expires. Russia's adaptation partially relocated the institutional conditions of petroleum circulation while leaving substantial Western network power and external dependence intact.

6.2 State Capability and External Operational Acceptance

Russia's continued exports do not demonstrate immunity from sanctions. Higher freight costs, longer routes, buyer concentration, insurance uncertainty, payment delays, and discounting establish operational pressure and, where net usable value declined, value compression. They do not by themselves establish functional interruption.

The relevant state capability was not ownership of every asset in the export chain. It was the capacity to help transform heterogeneous public, private, domestic, and foreign resources into an operational configuration capable of performing functions formerly supplied through Western-centred institutions. Public authority could enable private or foreign assets through regulation, guarantees, diplomatic coordination, export and currency rules, infrastructure, finance, and risk absorption.

This capability was nevertheless relational rather than unilateral. A vessel became effective capacity only when it could be chartered, documented, insured or guaranteed, loaded, discharged, and reused. Coverage became operational only when relevant ports, buyers, and

authorities accepted it, while settlement required participating banks and jurisdictions to process the transaction. Domestic coordination was therefore completed through external operational acceptance.

Three stages can be distinguished:

state enabling → operational constitution → external acceptance

State enabling comprises public authorisation, coordination, finance, guarantees, or risk absorption. **Operational constitution** occurs when assets, rights, contracts, coverage, and settlement arrangements are assembled and activated. **External acceptance** occurs when foreign counterparties and authorities permit the configuration to complete and repeat its function.

These stages clarify attribution. State enabling without operational constitution represents latent capability; an assembled configuration without external acceptance remains incomplete. Conversely, adaptation generated entirely through private commercial action may preserve exports without demonstrating state capability. Attribution therefore requires evidence connecting public intervention to a configuration that became externally usable within the viable interval.

Complete transaction-level visibility is not always possible. Port entry, loading, discharge, repeated route use, continuing buyer relations, and aggregate monetisation can provide operational traces, but they do not reveal every ownership, insurance, or payment relationship. Confidence increases when evidence independently corroborates several stages.

Legal measures formed part of state enabling but were not the material content of continuity. Law could authorise guarantees, alter settlement rules, regulate export proceeds, and

redistribute authority or risk. It could not independently transport, sell, discharge, or settle petroleum. Its causal importance lay in making alternative arrangements permissible, enforceable, financeable, or credible.

Russian state capability was consequently coordinated domestically but **relationally completed across jurisdictions**. This avoids reducing capability either to state ownership or to commercial adaptation without public authority. It also explains why the resulting structure remained partially parallel and hybrid rather than autonomous.

State capability under sanctions exists when public authority helps convert dispersed resources into an operational configuration that receives sufficient external acceptance to reproduce a critical function within its viable interval.

Its limits arise when external acceptance is withdrawn, substitutes cannot reach sufficient scale, replacement becomes operational too late, or the cost of maintaining the configuration exhausts the value required for subsequent reproduction.

6.3 Uneven Reconfiguration and Cost Distribution

The European Union provides a structured contrast rather than a second case. Russia had to reconstruct outward market access after losing established services and destinations, whereas the EU retained Western-centred transaction institutions but had to replace an established supplier. Russia's share of EU oil imports fell from 25.8 per cent in 2021 to 2.2 per cent in 2025, with increased imports from the United States, Norway, Kazakhstan, and other suppliers compensating

for much of the reduction (Council of the European Union, 2026b). The EU therefore demonstrated substantial aggregate replacement capacity.

The two sides required different capabilities. Russia possessed petroleum and export infrastructure but needed alternative vessels, insurance, buyers, and settlement channels. EU purchasers possessed finance but depended on compatible petroleum, transport, routes, storage, and delivery becoming available in time.

Aggregate European success concealed internal inequality. Member states differed in pipeline geography, port access, refinery configuration, storage, and capacity to absorb higher prices. Temporary exemptions for pipeline crude imports by states with specific geographical dependence and no viable alternatives made these differences legally visible (Council of the European Union, 2026a). Both sides therefore relocated rather than eliminated dependence: Russia relied more heavily on Asian demand and non-coalition intermediaries, while the EU became more dependent on alternative exporters and extended import logistics.

This comparison defines uneven continuity: an aggregate function may be reproduced while constituent actors experience interruption, higher costs, or longer adjustment. The initial payer of an adjustment cost need not bear its final incidence, and states possess unequal capacities to absorb, transfer, or defer such burdens.

The United States occupied a comparatively advantageous position because record crude production of 13.6 million barrels per day in 2025, inventories, fiscal capacity, and regulatory flexibility provided broader adjustment options than those available to import-dependent

economies (U.S. Energy Information Administration, 2026a, 2026b). This did not confer energy autonomy but increased its capacity to sustain policy while some costs appeared abroad through compliance, repricing, rerouting, insurance, and finance. Such externalisation is structural rather than necessarily intentional and remains limited by coalition cohesion, inflation, and incentives to develop alternative institutions.

Scope Implication: Continuity without Developmental Reproduction

For energy-importing developing economies, continued production may coexist with weakened development when higher energy and transaction costs divert resources from investment and technological upgrading. This constitutes continuity without developmental reproduction: present operations are preserved through adjustments that erode capabilities required for later development. Thailand and Vietnam illustrate possible fiscal and domestic-value-retention channels but are neither additional cases nor established findings. Testing this proposition requires a separate design tracing external costs through domestic prices, institutional incidence, investment, and subsequent productive capability.

6.4 Theoretical Implications

The findings contribute in four respects. First, they distinguish the **unit subjected to coercion** from the **function whose interruption constitutes the systemic outcome**. Control over a vessel, bank, insurer, or other node produces functional control only when its service cannot be transferred to another executable configuration.

Second, sanctions may catalyse **transactional reconfiguration** by increasing the value of alternative vessels, guarantees, currencies, jurisdictions, counterparties, and settlement channels. This is a potential endogenous limit of weaponised interdependence, but only when the alternative configuration is operationally sufficient, externally accepted, and repeatable.

Third, the analysis introduces time into restriction and substitution. Sustained interruption becomes likely when effective capacity is removed faster than replacement becomes operational and the deficit persists beyond available buffers and the function's viable interval. Later recovery cannot erase an interruption already incurred.

Fourth, sanctions operate across a **relational distributional field**. Exporters, coalition members, importers, intermediaries, firms, governments, and consumers possess unequal capacities to absorb, transfer, or defer costs. Continuity in one part of the circuit may therefore depend on risks or resource losses absorbed elsewhere.

Energy sanctions consequently initiate a contest over who can reconstruct the transaction protocol, whose recognition makes it operational, whether it becomes repeatable in time, and where its costs ultimately fall. This framework replaces a binary judgment of success with analysis of component restriction, functional interruption, timely reproduction, and the unequal incidence of continuity.

7. Conclusion

Evidence from December 2022 to 20 September 2026 supports a finding of **reproduced material-commercial continuity under operational pressure and variable value compression**.

Sanctions constrained vessels, insurers, financial channels, counterparties, and destination markets; increased transport and transaction costs; and interrupted particular transactions and corridors. They did not, however, produce sustained interruption of Russia's aggregate petroleum-export function during the observed period.

Russia preserved this function by reconstructing the institutional conditions of transport, delivery, monetisation, and subsequent operation. Reproduction did not require restoration of the original network or Russian ownership of every participating asset. It required timely access to usable vessels, accepted liability arrangements, willing buyers, ports, executable contracts, and settlement channels. Aggregate trade and fiscal evidence corroborates continuing monetisation of substantial exported volumes, although it does not establish settlement of every cargo.

Russian state capability operated through regulation, guarantees, diplomatic coordination, export and currency rules, infrastructure, and risk absorption. Yet state action was insufficient by itself. Foreign shipowners, ports, insurers, traders, banks, refiners, registries, and public authorities supplied the external acceptance required to make reconstructed transactions executable. Continuity was therefore state-enabled but relationally co-produced.

The resulting structure was neither an unchanged continuation of pre-sanctions trade nor an autonomous Russian alternative. It was a **partially parallel and hybrid export operating**

structure that reduced reliance on particular coalition-controlled services while retaining dependence on foreign demand, third-country jurisdictions, internationally circulating vessels, and world petroleum markets.

The article makes three contributions. First, it distinguishes the component targeted by sanctions from the function expected to disappear. Restricting a vessel, insurer, bank, or buyer produces systemic interruption only when the associated function cannot be transferred to another operational configuration.

Second, it conceptualises **transactional reconfiguration** as the time-bounded recombination of effective rights, accessible assets, guarantees, counterparties, jurisdictions, and settlement arrangements. Sustained interruption becomes likely when enforcement removes effective capacity faster than replacement becomes operational and the resulting deficit persists beyond available buffers and the function's viable interval.

Third, it shows that continuity is relational and distributionally unequal. Replacement capacity depends on external acceptance, while its costs and risks are distributed among exporters, governments, intermediaries, importing states, firms, and consumers. Aggregate continuity therefore does not imply unchanged welfare or uninterrupted operation at every component or corridor.

The Russian case demonstrates operational pressure, variable value compression, and interruption at particular scales, but not sustained aggregate interruption. Nor does continued export establish permanent resilience. Concentrated buyers, politically contingent intermediaries,

constrained insurance and settlement, and future coordinated restrictions could alter the balance between capacity removal and replacement.

The study remains limited by its focus on petroleum exports, opacity surrounding ownership and settlement, and an observation period ending on 20 September 2026. Within these limits, its central conclusion is that continuity under sanctions is an institutionally produced outcome: it depends on whether effective operational rights and complementary transaction arrangements can be reconstructed, externally accepted, and repeated before the available adjustment interval expires—and on which actors absorb the costs of doing so.

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**From Productive Transitions to Capability Accumulation: Evidence from Advanced
Manufacturing in Thailand and Vietnam**

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Abstract

Increasingly advanced production does not by itself establish capability accumulation, particularly when public documents reveal productive outcomes more clearly than the processes connecting them. This study examines how selected manufacturers respond to changing productive requirements and what documentary evidence permits researchers to infer about the retention and subsequent use of productive resources. A comparative longitudinal documentary analysis informed by process tracing examines five productive-transition episodes involving TLB, Meiko, SVI, and KCE in Thailand and Vietnam. The procedure separates documented transition states from the epistemic status of individual claims and assesses resource connections between distinct episodes.

The cases document operation of selected transferred processes, planned expansion, reported mass production, cross-site knowledge coordination, and investment postponement. The examined sources do not sufficiently establish the temporal connections required to substantiate capability accumulation. This result identifies an evidentiary limit rather than an absence of accumulation. In particular, knowledge deployment across sites within one programme does not by itself establish resource continuity between distinct episodes.

The study contributes an evidence-bounded procedure distinguishing production presence, productive transition, capability accumulation, and cumulative productive transformation. Stronger accumulation claims require evidence that resources associated with an earlier transition remained available and contributed to a later one. The approach supports assessment of specific documentary claims without treating differences in disclosure as differences in capability or ranking national productive systems.

Keywords: Productive Transition; Technological Capability; Capability Accumulation; Industrial Upgrading; Advanced Manufacturing; Thailand; Vietnam; Documentary Evidence

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1. Introduction

The technological-capability literature distinguishes the resources required to operate production from those required to generate and manage technological change. Research on latecomer firms shows that capability accumulation depends on knowledge acquisition, socialisation, and codification, with different rates of accumulation across technological functions (Figueiredo, 2002, 2003). It is therefore a temporal and organisational process rather than an automatic consequence of investment.

An observational problem arises where researchers lack detailed access to firms' internal processes. Documents may establish that a plant entered production, qualified a product, or adopted a more demanding function without identifying how the transition became possible. They may also leave unresolved whether knowledge, routines, or technical solutions associated with an earlier transition contributed to a later one. Increasingly advanced production and cumulative capability formation consequently require distinct evidence.

This distinction matters for Thailand and Vietnam's advanced-electronics and semiconductor strategies. Thailand seeks to deepen existing activities, develop upstream production, and strengthen domestic industry participants (Thailand Board of Investment [BOI], 2026). Vietnam's strategy targets design, fabrication, packaging, and testing, including at least 100 design enterprises, one small-scale fabrication plant, and ten packaging and testing plants by 2030

(Prime Minister of Vietnam, 2024). Monitoring these objectives requires distinguishing productive expansion from accumulation of the resources supporting subsequent technological change.

The study examines five episodes involving TLB, Meiko, SVI, and KCE through public documentary evidence. Its observational unit is the productive transition episode: a bounded response to changed productive requirements, including planned, operationalised, and delayed outcomes. The guiding question is: how do the selected producers respond to changed requirements, and what does the documentary record permit researchers to infer about resource retention and capability accumulation?

The analysis distinguishes requirement change, reconfiguration, qualification, and operationalisation from evidence connecting resources across episodes. It treats retention, recombination, or redeployment as temporal bridging only where an identifiable resource associated with an earlier episode contributes to a subsequent one.

The empirical contribution is a reconstruction of selected productive responses and their evidentiary limits. Analytically, the study specifies the connection needed to distinguish successive transitions from accumulation. Methodologically, it separates implementation state from the epistemic status of individual claims. Neither successful production nor delay independently establishes capability status, and differences in disclosure do not support national capability rankings. The broader question is whether one productive transition becomes part of the productive basis for the next.

2. Literature Review: From Industrial Upgrading to Observable Capability Accumulation

2.1 Industrial Upgrading and the Problem of What Changes

Industrial-upgrading research examines changes in what firms produce, how they produce it, and which functions they perform within production networks. Humphrey and Schmitz (2002) distinguish opportunities for upgrading from the constraints associated with particular forms of global value-chain governance. Participation may support improvements in products and processes while limiting access to other functions. Gereffi et al. (2005) further identify supplier capabilities, transaction complexity, and codifiability as determinants of governance arrangements.

These approaches move analysis beyond manufacturing presence toward changes in productive activity and inter-firm relationships. However, observing a new product, process, or value-chain function does not necessarily identify how the resources supporting that change were acquired or developed. Nor does it establish whether knowledge and routines exercised during one transition remain available for subsequent productive change. An observed upgrading outcome and a claim about capability accumulation therefore require related but distinct evidence.

Conventional indicators—including investment, exports, productivity, domestic value added, and technological intensity—remain useful for assessing structural change. The issue is not their validity for those purposes, but the additional inference required when they are used to substantiate organisational learning or capability accumulation. A sequence of more sophisticated outputs may establish changes in production without revealing the resource connections between them. Research on product relatedness also addresses the cumulative character of structural change.

Hidalgo et al. (2007) show that countries tend to diversify towards products related to their existing specialisations, reflecting differences in the resources required to enter new activities. This provides an aggregate perspective on how an existing productive base conditions subsequent development. The present study examines a different observational level: whether documents identify specific resources connecting productive transitions within firms. Product relatedness and episode-level resource tracing therefore address complementary questions.

The question pursued here is consequently narrower than whether upgrading occurs. It concerns what evidence establishes that resources associated with an earlier productive transition contributed to a later one. Addressing this question requires connecting the upgrading literature to research on technological capabilities and learning processes.

2.2 From Production Capacity to Technological Capability

The technological-capability literature provides a foundation for distinguishing productive outcomes from the resources supporting technical change. Bell and Pavitt (1992, 1993) distinguish production capacity—the resources required to operate existing production—from technological capabilities, understood as the resources required to generate and manage technical change. Capacity may expand through investment and imported technology without equivalent development of the knowledge, experience, organisational arrangements, and linkages required for subsequent change.

Lall (1992) similarly treats technological capability as developing through interactions among firm-level effort, incentives, and institutions. Investment in facilities and equipment therefore provides part of the productive basis, but does not automatically establish the capabilities needed to select, adapt, improve, or develop technology.

Figueiredo (2002, 2003) examines the relationship between learning processes and differing rates of technological-capability accumulation in latecomer firms. External and internal knowledge acquisition, knowledge socialisation, and knowledge codification help explain how knowledge becomes available beyond individual experience. This directs attention to the organisational processes through which resources for technical change are acquired, shared, and maintained over time. Absorptive capacity provides a further explanation of why access to external knowledge does not automatically produce learning. Cohen and Levinthal (1990) emphasise the role of prior related knowledge in recognising, assimilating, and applying new knowledge. Nelson and Winter's (1982) account of organisational routines likewise directs attention to the organisational basis of recurrent productive activity. Together, these perspectives suggest that accumulation depends on how knowledge becomes usable within an organisation, rather than on its acquisition alone.

Evidence from East Asian electronics reinforces the importance of tracing learning processes. Hobday (1995) examines how latecomer firms developed technological competence through assimilation, adaptation, and innovation, with export customers shaping learning requirements. Such research establishes substantive processes through which catch-up can occur.

The documentary approach developed here asks what evidence is sufficient to identify continuity in those resources across particular productive transitions.

These studies establish that capability accumulation is a process requiring empirical reconstruction, rather than an attribute that can be inferred directly from production sophistication. Detailed longitudinal access can reveal learning activities, technical problem-solving, and changes in organisational knowledge. Public documentary evidence, however, may provide more precise records of facilities, equipment, qualification, and production milestones than of the learning processes associated with them.

The observational problem becomes particularly acute when analysis connects successive transitions. Documents may establish that two productive functions became operational while leaving unresolved whether knowledge, routines, or technical solutions associated with the first contributed to the second. Evidence of productive continuity is therefore insufficient, on its own, to establish continuity in the resources supporting technical change.

The gap addressed here concerns this evidentiary relationship. The distinction between production capacity and technological capability, and the importance of cumulative learning, are established contributions of the literature. The present study asks how claims about accumulation can be bounded when the retention and subsequent use of productive resources are only partly observable.

2.3 Global Production Networks and Distributed Capability

Advanced manufacturing frequently distributes productive functions and their supporting resources across organisations and locations. Plants, headquarters, customers, equipment suppliers, and engineering teams may contribute to the same transition. GVC research explains coordination through relationships among transaction complexity, codifiability, and supplier capabilities (Gereffi et al., 2005). It therefore provides a basis for examining productive activity as part of inter-organisational arrangements rather than attributing all supporting resources to the production site. Global production-network research extends this discussion to knowledge diffusion and the organisational and territorial relationships supporting production. Ernst and Kim (2002) examine connections between global production networks, knowledge transfer, and local capability formation. Coe et al. (2008) develop the GPN framework as an approach to understanding interconnected production and development processes. These contributions support examination of capability formation within network relationships while leaving the retention and subsequent use of particular resources as empirical questions.

This distribution creates an attribution problem. Qualification of a new product may depend on local engineering, transferred procedures, supplier intervention, customer assistance, or combinations of these contributions. Evidence of qualification or production alone may not distinguish among them. It consequently cannot establish where the relevant knowledge originated, which actors control it, or whether it remains available locally for subsequent use.

Research on Southeast Asian industrialisation highlights the developmental importance of these distinctions. Angelino and Masina (2014) examine constraints on Malaysia's industrial catching-up, including limitations in domestic technological development. Masina and Cerimele (2018) question whether expansion of foreign-dominated export manufacturing in Vietnam constitutes a deeper process of national industrialisation. These studies caution against treating manufacturing expansion as sufficient evidence of domestic capability formation.

External participation nevertheless provides possible channels for acquiring and adapting productive knowledge. Assistance from headquarters, customers, or suppliers may contribute to local learning where knowledge is absorbed, retained, and subsequently used. Continued external involvement does not establish that such learning is absent. Conversely, participation in a production network does not establish that these processes have occurred.

Capability attribution therefore requires evidence appropriate to the organisational level of the claim. A documented arrangement may establish that a plant performs a function, that a firm coordinates resources across sites, or that knowledge passes between organisations. Claims about national accumulation additionally require evidence that relevant resources become available within the wider productive system. These levels cannot be substituted for one another.

The question for the present study is how documentary evidence identifies the actors and resource connections supporting productive transitions, and whether those connections extend beyond an immediate programme to subsequent productive change.

2.4 From Capability Accumulation to the Problem of Observation

The preceding literature connects upgrading opportunities to governance arrangements, distinguishes production capacity from technological capability, and explains accumulation through organisational learning (Humphrey & Schmitz, 2002; Gereffi et al., 2005; Bell & Pavitt, 1992, 1993; Lall, 1992; Figueiredo, 2002, 2003). The remaining question concerns how the connections underlying accumulation can be observed through public documents.

Records of two successive operational functions may establish upgrading without showing whether resources associated with the earlier transition contributed to the later one. Retained knowledge, adapted routines, and reused technical solutions may operate alongside new equipment, external assistance, and recruited personnel. The task is to identify the contribution of earlier resources, rather than infer accumulation from productive success or exclude it because external inputs were involved.

Evidentiary resolution depends on what a source can establish about these connections. Organisational histories may expose knowledge acquisition and reuse, while public records may identify production milestones more clearly. Neither source type guarantees sufficient support; provenance, specificity, and unresolved interpretations remain relevant.

The gap therefore concerns the evidence required to connect productive change with cumulative learning when internal processes are partly observable. The guiding question is: how can capability accumulation be distinguished from successive productive outcomes when their resource connections are incompletely documented?

The following section develops the productive transition episode to address this question, separating implementation state from the epistemic status of claims and assessing resource connections across distinct episodes.

3. Research Design and Methods

3.1 Research Design

This study employs a comparative longitudinal documentary design to examine five productive-transition episodes involving four manufacturers operating in Thailand and Vietnam. Comparison is conducted across episodes to assess variation in productive responses, implementation states, and evidentiary coverage. The design does not support a national comparison of technological capability.

The analysis addresses two connected questions. First, what responses to changed productive requirements are documented, and how does their implementation develop over time? Second, what does that evidence permit the researcher to establish about the retention, recombination, and subsequent use of productive resources? Separating these questions prevents an observed outcome from substituting for evidence of the process supporting it.

The study combines dated event reconstruction with claim-level assessment informed by process tracing. It draws on attention to temporal sequence, diagnostic observations, and alternative explanations (Collier, 2011; Bennett & Checkel, 2015). These principles guide evaluation of the documentary record without presuming that a complete causal mechanism can be reconstructed for every episode.

The analysis distinguishes productive processes from their representation in documents. Learning or resource retention may occur without public disclosure, while a corporate description may report an arrangement without independently establishing its implementation. Documentary visibility is therefore treated as a condition of observation, rather than a direct measure of capability.

Inference is bounded by the discriminatory value of the evidence. Where several explanations remain compatible with an observed outcome, the analysis specifies what is documented and leaves the unresolved relationship undetermined. It also allows retained resources and newly acquired inputs to contribute jointly to a transition. The purpose is to assess the support for particular claims, including their organisational and temporal scope, rather than select a single explanation solely from theoretical expectations.

3.2 Unit of Analysis: The Productive Transition Episode

The productive transition episode is an empirically bounded period initiated by a documented change in productive requirements and encompassing responses intended to operationalise the required function. Outcomes may be operational, partial, ongoing, delayed, or abandoned. Each episode specifies the requirement, productive function, organisational location, and documented trajectory. The latest record provides an observation point rather than necessarily establishing completion. A firm may contribute multiple distinct episodes.

Changed requirements may involve a new specification, a more demanding process, transfer to another site, or expansion requiring a distinct productive configuration. Investment,

floor space, or output growth alone is insufficient. TLB Plant 2 and KCE Rojana qualify because their documents connect planned factory configurations to production constraints or additional business and HDI requirements (TLB Co., Ltd., 2026; KCE Electronics Public Company Limited, 2024, p. 21). Neither is treated as demonstrated first acquisition of the relevant capability.

The observational scaffold comprises requirement change (R), reconfiguration (C), qualification or validation (Q), and operationalisation (F). Reconfiguration concerns equipment, processes, engineering arrangements, or production organisation; qualification concerns a relevant technical or customer gate; operationalisation concerns entry into an identifiable productive state.

These elements guide reconstruction without prescribing a universal causal sequence. Observed requirements, qualification, and production do not establish undocumented reconfiguration. Missing evidence is distinguished from an inapplicable element.

Function scope is assessed separately from implementation state. Selected transferred processes may operate without reproducing the source facility's complete configuration. Partial transfer therefore does not establish incomplete implementation. Where intended scope is unclear, completion relative to a broader target remains unresolved. Later records may update the state, but episode boundaries are not narrowed retrospectively to match an outcome. Operation of specified functions is distinguished from completion of all planned lines.

3.3 Episode Identification and Case Selection

Document collection began in approximately August 2026 and was completed in September 2026.

The cited sources were checked again during manuscript revision in October 2026.

Episodes were identified where documents described a bounded change in productive requirements and a corresponding response. Inclusion required evidence identifying the function and at least part of its temporal trajectory. Investment or output growth without an identifiable requirement and response was insufficient.

Selection was purposive and based on documentary observability rather than successful implementation. Five episodes involving four firms provide contrasting evidence of process transfer, planned expansion, reported mass production, cross-site coordination, and postponement. TLB contributes two episodes because its documents distinguish transferred processes operating at Plant 1 from the subsequent planned configuration of Plant 2.

The cases were retained for their relevance to distinguishing productive transition from capability accumulation. TLB permits examination of transfer scope and planned expansion. Meiko's May 2026 presentation reports production initiation and mass production of identified functions alongside continuing line expansion. SVI describes coordination within a distributed programme, while KCE documents a delayed expansion.

The sectoral scope covers advanced electronics and semiconductor-related manufacturing, without treating the activities as technologically interchangeable or representative of the semiconductor industry. Geographical scope identifies operations in Thailand and Vietnam rather

than the origin of all supporting resources. The SVI episode includes US operations because the documented programme spans both locations.

The sample is not statistically representative. Selection by documentary observability may favour firms with accessible disclosures. Including planned and delayed episodes broadens outcome coverage but does not eliminate disclosure-related selection bias. Comparison concerns the selected episodes and the claims their evidence supports.

3.4 Documentary Evidence and Triangulation

The analysis reconstructs dated productive responses from TLB's securities registration statement, Meiko's FY2025 financial results presentation published in May 2026, SVI's corporate accounts, and KCE's AGM minutes. Government and investment-agency documents provide policy context rather than independent verification of firm-level processes.

Sources are assessed for purpose, provenance, completeness, and relationships to other evidence (Bowen, 2009). Scott's (1990) criteria add attention to authenticity, credibility, representativeness, and meaning. Official publication identifies provenance without independently confirming reported processes; selective disclosure limits coverage, while reporting context affects interpretation.

Filings, AGM minutes, and presentations document reported plans, decisions, and production milestones. Their formal setting does not verify every technical claim or management explanation. Corporate programme accounts may provide process detail while serving

promotional purposes. Generic procedures are not attributed to a particular episode without a documented connection, and group-level capabilities are not automatically assigned to individual plants.

Triangulation distinguishes independent-source corroboration from longitudinal comparison. Reproductions of one announcement share an evidentiary origin. Successive company records may reveal changing trajectories or inconsistencies but remain dependent on that organisation. Independent corroboration is not presumed where unavailable.

Plans are distinguished from implementation. Later records are examined for operation, modification, postponement, or discontinuation without filling gaps through assumption. The findings identify supporting sources and available page or section locators, retaining corporate attribution and distinguishing direct reports from analytical inference.

3.5 Transition State and Epistemic Status

Transition state describes implementation of a specified function at a dated observation point. Epistemic status describes the support for an individual claim. The two dimensions are assessed separately.

Planned denotes an announced transition without established implementation; Ongoing, implementation without established productive operation; Partial, operation of only part of the specified function; Operationalised, entry of that function into its relevant productive state; Delayed, postponement relative to the documented trajectory; Abandoned, discontinuation; and Outcome Unknown, insufficient evidence of subsequent status.

Operationalisation does not require full capacity utilisation or completion of every planned line. Reported mass or recurring production may establish operation of identified functions while wider expansion continues. Partial transfer from another facility likewise does not establish incomplete implementation. Scope and remaining work are reported separately, and episode boundaries are not narrowed retrospectively to fit outcomes.

Claims receive O, documented observation; I, evidence-bounded inference; or U, undetermined. These describe evidentiary support rather than capability levels.

O identifies what a source directly reports, retaining its attribution and scope; it does not imply independent verification. I identifies an interpretation supported by evidence that discriminates among relevant alternatives, with its organisational and temporal limits specified. U identifies insufficient documentation, specificity, or discrimination to determine a relationship; it does not establish substantive absence.

An operationalised function may therefore coexist with unresolved claims about knowledge origin or reuse, while a plan or delay may be directly documented. Cross-site deployment within one programme does not establish temporal bridging between distinct episodes. Accumulation requires evidence that earlier resources remained available and contributed subsequently, potentially alongside new inputs or external assistance.

3.6 Claim-Level Evidence Assessment and Inferential Rules

The analysis assesses individual claims within each productive-transition episode. Assessment covers requirement change, productive reconfiguration, qualification or validation,

operationalisation, relationship to the prior productive function, retention, recombination, redeployment, cross-episode linkage, and capability accumulation. These categories guide examination of the documents rather than constitute a capability score.

Claims are classified as documented observations (O), evidence-bounded inferences (I), or undetermined relationships (U), following Section 3.5. The findings identify the relevant sources and, where available, the page or section supporting specific claims. They distinguish what a source directly reports from the interpretation advanced by the analysis. Table 1 summarises transition states and the status of cross-episode accumulation claims.

Cross-episode bridging requires evidence connecting an identifiable resource associated with an earlier episode to its subsequent availability and contribution in a later episode. Relevant resources may include process documentation, testing routines, technical solutions, equipment knowledge, engineering teams, or organisational arrangements. Repeated production success or continuity of personnel alone does not establish that connection. Knowledge deployment across sites within one programme is also distinguished from reuse across separate episodes.

Evidence is assessed for its capacity to identify the resource, establish its temporal continuity, specify its subsequent use, and discriminate among relevant interpretations. Provenance, reporting purpose, specificity, and corroboration constrain the support available for each claim. A detailed corporate description may identify a reported arrangement without independently verifying its implementation or effectiveness.

The governing principle is that the scope and specificity of a claim should not exceed the support provided by its evidence. A record establishing production at a plant cannot, without additional evidence, establish local knowledge origin, cross-episode accumulation, or diffusion within a national productive system.

This principle draws on process tracing's attention to diagnostic observations and alternative explanations (Collier, 2011; Bennett & Checkel, 2015). The present approach applies these principles to productive-transition episodes without presuming complete reconstruction of a causal mechanism.

Local engineering, headquarters assistance, supplier involvement, and newly acquired inputs may contribute jointly to a transition. The assessment therefore asks whether the particular contribution of earlier resources is supported, rather than requiring every alternative contribution to be excluded. Where that connection cannot be established, capability accumulation remains undetermined.

Within an episode, documented requirements, qualification, and production do not establish an undocumented reconfiguration. Across episodes, successive operational functions do not establish retention or reuse. The analysis preserves these unresolved relationships rather than filling gaps through theoretical expectation.

The author assessed the documentary evidence and assigned the epistemic classifications. During revision, the cited sources were rechecked against the claims and classifications reported in the manuscript.

4. Findings: Productive Transitions and the Limits of Capability Inference

The five episodes differ in their documented implementation states and in the claims their sources support. The records describe operation of transferred processes, planned reconfiguration, reported mass production alongside continuing production-line expansion, and investment postponement. The analysis distinguishes these reported events and arrangements from inferences concerning resource retention and capability accumulation. Each episode is assessed at a specified observation point and organisational scope, with corporate provenance retained in the interpretation. The findings concern the selected episodes rather than firm or national capability rankings.

4.1 TLB VINA: Partial Transfer and Planned Functional Expansion

TLB VINA illustrates why factory operation must be distinguished from the scope of productive-function transfer. Vietnam Plant No. 1 began operations in October 2024. TLB reports that the facility operated selected production processes transferred from its Ansan headquarters. Reported sales from the Vietnamese subsidiary in 2025 further support the conclusion that the facility had progressed beyond investment and construction into productive operation (TLB Co., Ltd., 2026, sections on subsidiary financial performance and the use of offering proceeds).

The evidence establishes operation of the transferred processes, but not reproduction in Vietnam of the complete productive configuration located in Ansan. Plant No. 1 is therefore classified as Operationalised with respect to the transferred processes, while the scope of transfer is recorded separately as partial. Partial transfer does not itself establish incomplete

implementation: the available documentation does not show that reproducing the entire Ansan configuration was the intended scope of Plant No. 1.

Plant No. 2 represents a subsequent planned reconfiguration. TLB's investment documentation links the expansion to production constraints arising as a larger share of process-intensive products increases processing time and layering requirements. It describes a second factory adjacent to Plant No. 1, designed for a production capacity of approximately 20,000 m² per month, with staged installation of PCB production equipment following building completion (TLB Co., Ltd., 2026, section on the use of offering proceeds). The episode therefore concerns a documented response to changed production requirements, even though the relevant manufacturing activities are not entirely new to the firm.

At the date of the filing, these records establish a planned configuration rather than its implementation or operationalisation. Plant No. 2 is consequently classified as Planned.

The two episodes establish operation of selected transferred processes followed by planned expansion. They do not establish whether resources exercised or developed through Plant No. 1 were retained, recombined, or redeployed in Plant No. 2. Cross-episode bridging evidence therefore remains undetermined, leaving capability accumulation unresolved.

4.2 Meiko Vietnam: Operationalised Transition Without Established Cross-Episode Linkage

Meiko's FY2025 financial results presentation, dated May 21, 2026, reports that Vietnam Plant No. 4 began operations in July 2025 to supplement Plant No. 2's production capacity. It also reports

that mass production of PCBs for satellite and AI applications has commenced, while production lines continue to expand (Meiko Electronics Co., Ltd., 2026, p. 17). At this documented observation point, the identified productive functions are classified as Operationalised. This classification records their reported entry into mass production; it does not establish completion of all planned lines or achievement of full design capacity.

The records thus distinguish operation of identified functions from continuing expansion of the wider facility. The dated classifications describe the documented trajectory without treating transition state as a permanent attribute of the plant.

The cross-episode relationship remains unresolved. Although the documents establish earlier production in Vietnam and subsequent operation of Plant No. 4, they do not establish whether engineering knowledge, routines, technical solutions, or other productive resources associated with an earlier transition contributed to the later one.

Meiko consequently illustrates how documentary evidence can establish a change in productive state without establishing the resource connection required for a capability-accumulation claim. Cross-episode bridging evidence and capability accumulation remain undetermined.

4.3 SVI: Documented Cross-Site Knowledge Coordination and Deployment

SVI's corporate materials describe arrangements for coordinating productive knowledge across sites. Its account of an AI-infrastructure electronics programme reports concurrent NPI activities at SVI Thailand and SVI Electronics USA using a common engineering baseline, aligned process

documentation, standardised test specifications, and a shared traceability framework. It states that process findings from either location were evaluated against the baseline and incorporated into both manufacturing environments before mass production (Nookaew, 2026a, section “Dual-Site NPI”).

The same account reports PCBA mass production in Thailand, followed by transfer to the United States for box-build assembly, system-level integration, final testing, and delivery preparation (Nookaew, 2026a). These statements document the company’s reported allocation of productive functions and deployment of process findings across sites.

A separate corporate account describes group-wide engineering standards and controlled deployment of engineering changes across applicable facilities (Nookaew, 2026b). This provides organisational context, but does not establish application of every described procedure to the specific programme.

Claims directly reported in these sources are coded O with their corporate attribution retained. This classification does not establish independent verification of implementation, effectiveness, or durability.

The documented connection is spatial and organisational within one programme. Concurrent NPI and incorporation of findings across facilities do not establish that resources associated with an earlier, distinct productive-transition episode contributed to a subsequent episode. Cross-site deployment is therefore distinguished from temporal bridging.

The distributed arrangement also limits geographical attribution. Reported production in Thailand does not establish that all supporting knowledge originated or remained available there. The evidence supports analysis of coordination within the Thai-US programme, without resolving exclusive local origin or longer-term availability.

SVI illustrates how corporate documentation can make cross-site knowledge coordination visible while leaving longitudinal resource connections unresolved. Capability accumulation across distinct productive-transition episodes remains undetermined.

4.4 KCE: Delayed Transition Without Established Capability Failure

KCE provides a contrasting outcome because its planned Rojana expansion remained postponed. The company already produced HDI PCBs before the proposed investment. Its 2024 AGM minutes describe Rojana as an expansion intended to accommodate additional business and HDI production, including laser processing for the small holes required in HDI products. The same account reports that management was considering postponing construction, with production then anticipated for late 2025 or early 2026 (KCE Electronics Public Company Limited, 2024, p. 21).

The episode therefore concerns the planned establishment of an additional productive configuration for an existing function, rather than the firm's first acquisition of HDI production. It qualifies as a productive-transition episode because the documented expansion entails a new factory configuration responding to additional production requirements. This does not imply that the intended function is technologically new to the firm.

In its 2026 AGM minutes, KCE reports that the project has been temporarily postponed. Management reports production efficiency of approximately 70% and indicates that construction would be reconsidered when utilisation exceeds 90%. It attributes the postponement to supply-demand conditions and the stronger Thai baht (KCE Electronics Public Company Limited, 2026, p. 19). These statements document management's explanation; they do not independently establish the relative causal importance of those factors.

At the latest documented observation point, the episode is classified as Delayed. The available evidence does not establish technological incapability as the explanation for postponement. The reported existence of HDI production establishes that the firm already performs the function targeted for expansion, but does not establish readiness for every technical and organisational requirement of the proposed configuration.

KCE consequently illustrates why transition outcome and capability status must be assessed separately. Delay does not establish capability failure, while prior production does not establish successful implementation of the proposed expansion. Including delayed episodes avoids restricting the analysis to transitions that culminate in productive operation.

4.5 Cross-Case Findings

The five episodes reveal variation in transition state and in what the documentary record permits the analysis to establish. TLB Plant 1 documents operation of selected transferred processes, whereas Plant 2 remains a planned configuration. Meiko's May 2026 presentation reports mass production of identified functions alongside continuing production-line expansion. SVI's

corporate accounts describe production and knowledge coordination across sites within one programme. KCE documents a postponed expansion and management's explanation for that decision. Table 1 summarises these distinctions.

Table 1

Cross-Case Comparison of Productive Transition States and Evidentiary Resolution

Episode	Documented transition state	Within-episode evidence	Temporal bridging between distinct episodes	Capability accumulation
TLB VINA Plant 1	Operationalised for transferred processes	Selected transferred processes operating; full configuration transfer not established (TLB Co., Ltd., 2026)	U	U
TLB VINA Plant 2	Planned	Factory and production-line configuration planned; implementation not	U	U

Episode	Documented transition state	Within-episode evidence	Temporal bridging between distinct episodes	Capability accumulation
		established at filing date (TLB Co., Ltd., 2026)		
Meiko Vietnam Plant 4	Operationalised for identified functions in 2026	Mass production of PCBs for satellite and AI applications reported; production-line expansion continues (Meiko Electronics Co., Ltd., 2026, p. 17)	U	U
SVI Thailand– USA programme	Operationalised according to corporate reporting	Cross-site NPI, shared baseline, process findings, and production allocation reported; wider procedures described separately (Nookaew, 2026a, 2026b)	U; cross-site coordination concerns one programme	U
KCE Rojana	Delayed	Expansion postponed; management reports	U	U

Episode	Documented transition state	Within-episode evidence	Temporal bridging between distinct episodes	Capability accumulation
		utilisation and commercial explanations (KCE Electronics Public Company Limited, 2024, 2026)		

Note. Author's analysis of TLB Co., Ltd. (2026), Meiko Electronics Co., Ltd. (2026), Nookaew (2026a, 2026b), and KCE Electronics Public Company Limited (2024, 2026). Transition states refer to the specified function and documented observation point. U = undetermined; this classification does not establish the absence of capability accumulation or constitute a capability ranking. Cross-site coordination within one programme is distinguished from temporal bridging between distinct episodes.

First, documentary evidence can establish productive responses at greater resolution than the connections required for capability-accumulation claims. The responses examined include process transfer, planned factory reconfiguration, entry into mass production, cross-site coordination, and investment postponement. Meiko's dated records, for example, establish a change in implementation state without establishing how resources from an earlier episode

contributed to that change. Within-episode reconstruction and cross-episode linkage therefore require different evidence.

Second, the scope of a documented connection constrains its interpretation. SVI's account describes incorporation of process findings across sites within one programme. This supports a claim about reported organisational coordination, but not a temporal bridge between distinct episodes. Likewise, TLB's partial transfer describes the scope of processes transferred from Ansan; it does not by itself establish incomplete implementation of Plant 1's intended function. Both cases demonstrate the importance of matching claims to the organisational, spatial, and temporal boundaries of the evidence.

Third, transition outcome does not determine capability status. KCE's postponement does not establish technological incapability, while productive operation in TLB, Meiko, or SVI does not by itself establish capability accumulation. Management's explanations and corporate descriptions remain identifiable source claims rather than independently verified accounts of all processes producing the observed outcome.

All capability-accumulation entries are consequently coded U. This common classification does not imply that the firms possess equivalent capabilities or that accumulation did not occur. It records that the examined documents do not sufficiently establish the temporal connections required for that claim. The comparison therefore identifies variation in documented productive responses and evidentiary coverage, rather than a national or firm-level capability ranking.

5. Discussion

5.1 From Productive Transitions to Capability Accumulation

The findings develop the observational implications of an established distinction in the technological-capability literature. Production capacity concerns the resources required to operate production, whereas technological capability concerns the resources required to generate and manage technical change (Bell & Pavitt, 1992, 1993). Longitudinal studies further demonstrate that capability accumulation depends on learning processes through which knowledge becomes organisationally available over time (Figueiredo, 2002, 2003). The present study addresses how claims about that accumulation can be assessed when public documents provide uneven access to the processes involved.

The cases document different productive responses while leaving temporal resource connections unresolved. TLB reports operation of selected transferred processes and a subsequent planned expansion. Meiko reports mass production of identified functions alongside continuing production-line expansion. SVI reports knowledge coordination across sites within one programme. KCE documents postponement of a planned expansion. These records support claims about reported events and arrangements, but none sufficiently establishes that resources associated with an earlier, distinct transition contributed to a later one.

The contribution therefore concerns the evidentiary connection between productive episodes. A documented operational outcome supports a claim that a specified productive function was performed at the reported observation point. It does not establish the durability or

wider scope of that performance. A capability-accumulation claim additionally requires evidence concerning which resources remained available and how they contributed when requirements changed. Such resources may have been acquired externally, developed internally, or combined through a production network. Their origin alone does not determine whether accumulation occurred.

A hypothetical example illustrates the distinction between U and I. Suppose dated records from a first episode identify a testing routine developed to resolve a production problem. Records from a later episode identify adaptation of that routine, continued involvement of the responsible engineering team, and successful validation under a new specification. If these observations have sufficiently specific and credible provenance, they could support an evidence-bounded inference that resources from the earlier episode contributed to the later transition. The claim could be coded I even if no single document explicitly describes capability accumulation. The inference would concern the identified routine and transition, rather than the firm's overall capability. Repeated production success or unchanged personnel alone would provide weaker discrimination among alternative explanations.

Evidentiary resolution is consequently judged by a document's capacity to distinguish relevant interpretations. Specific identification of a resource, its timing, organisational location, continuity, and subsequent use provides greater discriminatory resolution than a general statement about advanced production. Detail alone is insufficient: provenance, reporting purpose,

corroboration, and unresolved alternatives also affect what the evidence can support. A detailed corporate account may make a process visible while leaving its implementation or effectiveness independently unverified.

This procedure is compatible with process tracing's assessment of diagnostic evidence and alternative explanations (Collier, 2011; Bennett & Checkel, 2015). Its specific contribution is to organise documentary assessment around productive-transition episodes, separate implementation state from epistemic status, and require an explicit temporal bridge before advancing a capability-accumulation claim. It does not replace established evidential tests or claim a new general theory of inference.

The relevant time horizon is determined by the process being investigated rather than a fixed number of years. Assessing accumulation requires observation extending from an earlier transition through an interval of retention to a subsequent occasion on which the resource is used or adapted. The relatively short documentary window examined here limits that assessment. A longer observation period would improve opportunities to identify such connections, although duration alone would not establish them.

The productive transition episode thus provides an intermediate unit between aggregate industrial indicators and intensive reconstruction of organisational learning. It permits bounded reconstruction of productive responses while keeping unresolved connections visible. Its value lies in specifying the additional evidence needed to move from observing productive change to substantiating accumulation.

5.2 Distributed Production and Capability Attribution

Distributed production complicates the attribution of capability because the location of an operational function need not coincide with the origin or organisational control of the resources supporting it. Engineering, NPI, qualification, manufacturing, and testing may be coordinated across several sites and organisations. GVC research provides a basis for examining these relationships through transaction characteristics, coordination arrangements, and supplier capabilities (Gereffi et al., 2005).

SVI illustrates this issue through its reported coordination of Thai and US operations. The corporate account describes a shared engineering baseline and incorporation of process findings across both sites within one programme (Nookaew, 2026a, section “Dual-Site NPI”). Reported production in Thailand supports a claim about the Thai facility’s operational role, while leaving the origin, distribution, and continued availability of the supporting knowledge only partly resolved. It establishes neither exclusively local capability formation nor an absence of local learning.

Capability attribution therefore requires separate attention to where a function is performed, which actors contribute its supporting resources, and where those resources remain available for subsequent use. These relationships may differ. Knowledge originating outside a country may become locally adapted and retained, while knowledge exercised at a local plant may remain dependent on arrangements controlled elsewhere.

This distinction is relevant to foreign-investment-led industrialisation. Research on Malaysia and Vietnam cautions against equating expansion of foreign-linked manufacturing with deeper domestic capability formation (Angelino & Masina, 2014; Masina & Cerimele, 2018). The present analysis adds an evidentiary requirement: claims about local accumulation must identify resources retained or adapted locally and establish their contribution to subsequent productive change. Foreign participation or continuing external assistance alone cannot determine the result.

Moving from a plant or firm to a national productive system requires additional evidence. A documented resource connection within one firm does not establish diffusion to domestic suppliers, mobility of technical knowledge across organisations, or wider availability of engineering and problem-solving resources. Such processes would require supplier records, workforce trajectories, inter-organisational collaboration, or other evidence appropriate to the national-level claim.

The cases consequently support bounded analysis of reported productive arrangements. They do not permit the location of advanced production, the ownership of a facility, or the visibility of corporate disclosure to serve as a proxy for national capability accumulation.

5.3 Cumulative Productive Transformation and Development

The distinction between productive transition and capability accumulation also clarifies the interpretation of industrial development. Investment, exports, productivity, domestic value added, and technological intensity provide evidence of structural change. Their analytical value remains

substantial, but they do not directly establish whether resources associated with one productive transition contribute to later transitions.

Successive productive upgrading refers here to a sequence in which increasingly demanding productive functions become operational. Cumulative productive transformation refers to a stronger relationship: resources established, acquired, adapted, or exercised through earlier transitions remain available and contribute to subsequent productive change. The distinction concerns the connection between transitions, rather than the sophistication of their outcomes alone.

Cumulativeness does not require technological self-sufficiency. Retained resources may be recombined with new equipment, personnel, customer assistance, supplier expertise, or externally acquired knowledge. The relevant question is whether earlier productive experience contributes demonstrably to later responses, rather than whether every supporting resource originates within the same firm or country.

The cases examined here do not establish cumulative productive transformation. They identify the evidence needed to investigate it. Even a substantiated connection between two firm-level episodes would support a bounded accumulation claim before it could support a broader developmental conclusion. Extending that conclusion would require evidence that resource connections recur across transitions and that the retained resources become available for productive use within a wider system.

This proposition connects the documentary approach to research on middle-income development. Studies of Thailand and technological upgrading emphasise the importance of learning, innovation, and the institutional conditions supporting more advanced capabilities (Intarakumnerd, 2019; Radosevic & Yoruk, 2018). The World Development Report 2024 similarly distinguishes development strategies centred on investment, technology infusion, and innovation (World Bank, 2024). These perspectives establish the developmental importance of capability formation; the episode-based approach specifies one way to assess the continuity of productive resources underlying it.

Cumulative productive transformation is therefore advanced as a relationship to be investigated through longitudinal evidence. The present empirical contribution is narrower: it demonstrates how documented productive change can be distinguished from unresolved claims about the accumulation supporting that change.

5.4 Policy Implications

The distinction between productive expansion and capability accumulation has implications for monitoring the semiconductor and advanced-electronics strategies discussed in the Introduction. Thailand's strategy seeks to expand investment and deepen productive activities, while Vietnam's strategy identifies targets across design, fabrication, packaging, and testing (Thailand Board of Investment, 2026; Prime Minister of Vietnam, 2024). Progress towards these objectives requires monitoring investment and production milestones. However, achieving such milestones does not

by itself establish that resources supporting subsequent technological change have accumulated locally.

Policy monitoring could therefore distinguish implementation outcomes from learning and resource-continuity outcomes. Facility completion, equipment installation, qualification, and production initiation indicate progress in implementing a productive function. Evidence of capability accumulation requires additional attention to which technical resources remain available and how they contribute when products, processes, or customer requirements change.

Investment-promotion agencies could complement existing reporting with proportionate records of technology transfer, engineering responsibilities, process adaptation, and subsequent reuse. For example, a transfer record could identify the function transferred, the personnel and documentation involved, and the recipient organisation's role. Follow-up assessment could examine whether those resources were used or adapted in a later productive transition. Training attendance or receipt of documentation alone would not establish that relationship.

Supplier-development programmes could similarly record changes in suppliers' engineering and problem-solving responsibilities across successive assignments. Participation, sales growth, and qualification are relevant outcomes, but stronger learning claims would require evidence that experience from an earlier assignment contributed to meeting a later requirement. Such records would help distinguish continued production participation from accumulation of resources for productive change.

Reporting should also separate the location of production from the origin, control, and continued availability of supporting knowledge. Cross-site coordination may enable advanced production without establishing that all relevant resources are retained locally. Conversely, external assistance may contribute to local learning. Assessment should examine these relationships rather than use foreign ownership or domestic production as a proxy for capability status.

These proposals do not require unrestricted disclosure of proprietary information. Confidential submissions, verification of selected records, and aggregated reporting could support assessment while protecting commercially sensitive material. The purpose is to improve the evidence available for evaluating learning and continuity, rather than replace investment and capacity indicators.

The selected cases do not establish the effectiveness of either national strategy. They identify an assessment problem relevant to both: productive expansion and capability accumulation should be monitored as distinct outcomes, with evidence appropriate to each.

6. Conclusion

This study examined what public documentary evidence permits researchers to establish about productive transitions and capability accumulation in advanced electronics and semiconductor-related manufacturing. Using five episodes from four firms operating in Thailand and Vietnam, it applied the productive transition episode as an observational unit and distinguished transition state from the epistemic status of individual claims.

The cases document different productive responses: operation of selected transferred processes and planned expansion at TLB, reported mass production of identified functions alongside continuing production-line expansion at Meiko, reported cross-site production and knowledge coordination at SVI, and postponement of an existing-function expansion at KCE. These records support claims about reported events and arrangements, but do not sufficiently establish temporal resource connections between distinct episodes. Capability accumulation is consequently undetermined in the examined cases; this classification does not establish its absence.

The principal contribution is an evidence-bounded procedure for distinguishing production presence, productive transition, capability accumulation, and cumulative productive transformation. Stronger claims require evidence that resources associated with an earlier transition remained available and contributed to a subsequent one. Successful production, investment expansion, spatial knowledge transfer, and delay cannot independently determine that relationship. The procedure therefore supports assessment of specific claims rather than capability rankings of firms or countries.

The study's empirical scope is limited by purposive selection, a relatively short documentary window, and substantial reliance on corporate reporting. Public disclosures provide uneven access to internal learning and may describe organisational procedures without establishing their implementation or effectiveness. Differences in documentary visibility must therefore remain separate from differences in productive capability. The cases support neither a

national comparison of capability accumulation nor a conclusion about cumulative transformation across either economy.

For industrial-policy assessment, the findings suggest that monitoring investment, facilities, capacity, and production milestones should be complemented by records of knowledge retention, adaptation, and subsequent use. Such evidence would help distinguish expansion of advanced production from the accumulation of resources supporting future productive change.

Future research could extend the observation period and combine documentary reconstruction with engineering records, supplier-development evidence, administrative data, and corroborated interviews. Tracing identifiable resources across successive transitions would permit stronger accumulation claims, while evidence of their diffusion across organisations would be necessary for broader developmental conclusions. The resulting research question is whether, and through which documented connections, one productive transition becomes part of the productive basis for the next.

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Spiritual Art in Soteriological Education

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Abstract

This conceptual article examines the proposed role of “spiritual art” in soteriological education, understood as a Christian approach to spiritual and moral education oriented towards reflection on salvation. It asks how selected artistic works can be interpreted within a Christian theological framework and translated into classroom activities. The discussion draws on educational literature, biblical passages, and illustrative examples from mythology, painting, and film: the cleansing of the Augean stables, Vincent van Gogh’s *Pietà*, and an exchange concerning ingratitude in *Waterloo*. The analysis distinguishes explicitly sacred subject matter from Christian readings introduced by an interpreter and separates these readings from documented claims about creators’ intentions. It proposes a teaching procedure involving observation, contextual understanding, supported interpretation, comparison of alternative readings, and reflection. In classrooms involving different beliefs, the procedure distinguishes understanding the Christian framework from affirming its religious premises. The article argues that using art

within soteriological education requires transparent interpretive reasoning and a clear distinction between proposed activities and demonstrated outcomes. No questionnaire findings or individual student analyses are reported; the educational effects of the proposed procedure remain to be evaluated. The article also outlines conditions for educational application, including curriculum design, teacher preparation, and pilot implementation.

Keywords:Soteriological Education, Spiritual Art, Christian Education, Theological Interpretation, Art Education

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1. Introduction

Soteriological education (SE), as developed in the author's work, is a Christian approach to spiritual and moral education oriented towards reflection on salvation and the relationship between human life and God. Within this perspective, education concerns not only professional preparation and conduct but also the spiritual purposes through which individuals understand their responsibilities and aspirations. Salvation is treated here as a theological commitment informing this educational approach, rather than an outcome that the present article claims to measure.

The author has explored SE in earlier publications, including a discussion of soteriological education through spiritual art (Totskyi, 2015) and an examination of SE in professional and technical education (Totskyi, 2024). The present article returns to the role of

art with a specific interpretive and pedagogical question: how can selected artistic works be read through a Christian theological framework and translated into classroom activities whose reasoning is explicit and open to discussion?

This question requires distinguishing the religious content of a work from the meanings introduced by an interpreter. An explicitly sacred work may present recognisable Christian subjects, while a mythological narrative or historical film may provide material for a Christian reading without having been created for that purpose. In either case, a theological interpretation should identify the details supporting it and distinguish its claims from documented evidence about the creator's intentions. The possibility of a meaningful Christian reading does not, by itself, establish that a work contains a concealed religious message.

The article's central argument is that the proposed educational role of "spiritual art" should be articulated through this distinction and through a transparent procedure of observation, contextual understanding, interpretation, comparison, and reflection. Rather than treating a theological reading as a conclusion students must reproduce, the procedure invites them to examine how it is constructed and where its limitations lie. In educational settings involving different beliefs, engagement with the Christian framework should permit questioning and disagreement without requiring religious affirmation.

The discussion develops this argument through three illustrative examples: the cleansing of the Augean stables, Vincent van Gogh's *Pietà*, and an exchange concerning ingratitude in *Waterloo*. These examples provide different relationships between artistic content and Christian interpretation. They are used to clarify an approach to teaching, rather than to demonstrate effects on learners.

The article is therefore conceptual in scope. It does not report questionnaire findings or individual student records, and it makes no empirical claim that the proposed activities produce spiritual growth or moral transformation. Its purpose is to explain the interpretive basis of using art within SE and to formulate a teaching procedure that can subsequently be examined in practice.

2. Literature Review

The literature considered here addresses the conceptual foundations of spiritual and moral education, its religious and philosophical orientations, and its proposed implementation in educational settings. These areas provide a background for examining the role of artistic interpretation within soteriological education (SE). Spiritual and moral education is treated as the broader field, while SE represents the particular Christian orientation adopted by the author.

At the conceptual level, Antonets (2009) discusses Sukhomlynskyi's educational thought in relation to spiritual and moral values, while Babii (2009) examines the meaning of moral education. Bekh (2009) considers the spiritual dimension of personal life, and Plivachuk (2016) addresses spiritual and moral education in relation to the formation of students' values. These works establish the relevance of values and personal development to the discussion, but those concerns should not automatically be equated with the theological aim of salvation that defines SE.

A second area concerns the religious and philosophical foundations of education. Kudryk (2008) examines human transformation in Ohienko's religious and philosophical thought, while Luchkevych (2008) discusses the philosophical and religious foundations of

Comenius's pedagogy. These subjects situate the present article within a discussion of how religious understandings of human life inform educational purposes. Marianski's (2008) examination of moral dilemmas among Polish youth introduces a related concern with the questions and choices encountered by young people. The present article approaches such reflection from a Christian perspective without treating that perspective as a premise shared by all learners.

A third area concerns educational practice. Milchevska and Yeromina (2018) discuss interactive methods in spiritual and moral education, while Mykhalchuk (2020) examines monitoring as a function of managing this educational process. For the present article, these topics raise two distinct questions: how classroom activities can be organised and how their outcomes might be assessed. Proposing an activity does not demonstrate its effectiveness, and a framework for monitoring development does not constitute evidence that development has occurred.

The author's previous publications provide the immediate background to the discussion of SE. The 2015 publication addresses soteriological education through spiritual art, while the 2024 article examines SE in professional and technical education (Totskyi, 2015, 2024). Earlier publications also address the diagnosis of spirituality and criteria of spiritual and moral development (Totskyi, 2013, 2014). These works should be distinguished from the present article's analysis: their classifications and diagnostic proposals are not used here as evidence of the educational effects of artistic interpretation.

The focus of the present article is the relationship between a work's observable content, the Christian concepts applied to it, and the classroom activities derived from that reading. This focus requires distinguishing explicitly sacred subject matter from a Christian interpretation introduced by the viewer. It also requires separating an interpretation's theological meaning from a documented claim about the creator's intentions.

Accordingly, the article develops an interpretive framework and a proposed classroom procedure rather than reporting an evaluation of students. Its argument is that the use of art within SE should make the basis of a theological reading explicit, allow comparison with alternative readings, and distinguish reflective learning activities from claims about spiritual transformation. The literature discussed above provides context for this argument; it is not presented as an exhaustive review establishing the absence of comparable approaches elsewhere.

3. Methodology

This article adopts a conceptual and interpretive approach to examine the role of "spiritual art" in soteriological education (SE). Its guiding question is how selected artistic works can be interpreted within a Christian theological framework and used to formulate educational activities. The analysis concerns the reasoning underlying these interpretations and their proposed pedagogical application; it does not evaluate changes in students' spiritual development.

The discussion draws on the author's publications on SE, relevant literature on spiritual and moral education, biblical passages, and selected examples from mythology, painting, and

film. The examples—the cleansing of the Augean stables, Vincent van Gogh’s *Pietà*, and a scene from *Waterloo*—serve as illustrative cases for examining relationships between artistic content and Christian themes. They encompass both an explicitly religious subject and subjects that can be given a Christian interpretation. They do not constitute a representative sample of artistic works, and the analysis does not establish that all art contains a hidden Christian meaning.

The interpretive framework distinguishes three elements: the content and context of the work, the Christian theological concepts used to interpret it, and the educational questions arising from that interpretation. The analysis first identifies the relevant narrative, visual, or verbal details. It then explains how those details may be related to such themes as purification, sacrifice, salvation, and gratitude. Finally, it considers how the proposed relationship can become a subject of classroom discussion and reflection. Biblical passages provide the theological reference points for these readings rather than empirical evidence of their educational effectiveness.

A distinction is maintained between an interpretation proposed by the author and a documented claim about an artist’s intentions. A Christian reading of a work does not, by itself, demonstrate that its creator intended that meaning or was unconsciously influenced by a spiritual source. Claims about the work’s historical context or the creator’s intentions require identifiable supporting sources. Interpretive claims are assessed through their connection to specific details in the work, their consistency with the stated theological framework, and consideration of plausible alternative readings. The resulting interpretations remain open to disagreement.

On this basis, the article proposes a classroom procedure involving observation of the work, identification of details supporting an interpretation, discussion of a Christian reading, comparison with alternative readings, and reflective responses. These activities are presented as a pedagogical proposal requiring subsequent evaluation. In settings involving students with different beliefs, engagement with the Christian framework should allow students to explain, question, or disagree with an interpretation without requiring them to affirm its religious premises.

No questionnaire findings, individual student records, or participant-level analyses are reported in this article. Accordingly, these materials are not used as evidence for its conclusions. The article's methodological scope is limited to conceptual clarification, interpretation of selected works, and formulation of a proposed educational procedure. It makes no empirical claim that this procedure produces spiritual growth, moral transformation, or attainment of a particular level of SE.

4. Spiritual Art and Its Proposed Educational Application

4.1 Defining Spiritual Art Within Soteriological Education

Within the Christian perspective adopted in this article, soteriological education (SE) concerns reflection on salvation and the orientation of human life towards God. Art is considered here as a possible medium for such reflection. This proposed role does not establish that exposure to an artwork necessarily produces religious commitment, moral transformation, or spiritual growth.

For analytical purposes, a distinction is made between explicitly sacred art and other works that can be interpreted through a Christian theological framework. Sacred art presents identifiable religious subjects, narratives, or symbols. Other works may address experiences such as suffering, gratitude, responsibility, or renewal without explicitly referring to Christian teachings. These works can nevertheless provide material for a Christian reading when the interpreter explains the relationship between details in the work and the theological concepts being applied.

The term “spiritual art” is therefore used in this article to describe the educational use of works that invite reflection on spiritual questions. It is not intended as an exhaustive classification of art or as a claim that every work contains a concealed Christian message. A work’s religious subject matter, the creator’s documented intentions, and the interpreter’s theological reading are related but distinct matters.

This distinction clarifies the basis on which artistic works are used within the proposed SE framework. The possibility of interpreting a work beyond its creator’s stated intentions does not justify attributing an unconscious religious intention to that creator.

4.2 Artistic Inspiration and the Limits of Interpretation

The relationship between artistic creation and interpretation provides a philosophical background to this discussion. In *Ion* and the *Apology of Socrates*, Plato considers poetic inspiration and questions whether poets can adequately explain what they create (Plato, 2008). These discussions are relevant to the distinction between producing a work and articulating its meanings. They do not, however, establish that artistic inspiration is Christian in origin or that a particular theological reading represents the creator’s intentions.

Within the present framework, Christian interpretation is an explicitly situated reading. Its credibility depends on showing how the interpretation relates to the work rather than merely declaring that a spiritual meaning is present. The interpreter should identify the relevant details, explain the theological connection, and acknowledge where the reading extends beyond what those details establish.

Hermeneutic reflection is used here to examine these relationships between a work, its context, and its interpretation. Biblical exegesis supplies a complementary discipline by attending to the context of the biblical passages used in the discussion. Neither activity is treated as a procedure that automatically reveals a single hidden meaning shared by every viewer.

4.3 The Augean Stables as an Analogy of Purification

The account of Hercules cleansing the stables of King Augeas by redirecting river water provides the first illustrative example (Mify Davnoi Hretsii, 2012). The narrative presents the removal of accumulated pollution through the intervention of a powerful external flow.

The author proposes reading this narrative as an analogy of spiritual purification. Within a Christian framework, the cleansing action can be brought into discussion with the imagery of living water and the Spirit in John 7:37–39 (Bibliia, 2009). The proposed connection concerns the relationship between pollution, cleansing, and renewal.

This analogy does not establish that the Greek narrative originally referred to the Holy Spirit or anticipated Christian teaching. Nor does the physical cleansing of the stables provide evidence about the process of salvation. Its educational value lies in the questions the comparison makes available.

A teacher could ask students which features make the analogy persuasive and where it becomes limited. For example, physical pollution can be removed by redirecting water, whereas Christian reflection on sin also involves questions of responsibility, repentance, and grace. Examining these differences prevents the analogy from being treated as a literal equivalence. Students may also offer readings centred on ingenuity, labour, or the resolution of an apparently impossible task.

4.4 Van Gogh's *Pietà* as an Explicitly Religious Example

Van Gogh's *Pietà*, based on a composition by Eugène Delacroix, provides an example with explicitly Christian subject matter (Vatican Museums, n.d.). Unlike the Augean stables, its relevance to Christian reflection does not depend on assigning a religious meaning to a non-Christian narrative.

The author's proposed reading focuses on suffering, compassion, and sacrifice. Within SE, the representation of the dead Christ and the mourning mother can become a starting point for discussing the relationship between human suffering and the Christian understanding of salvation. This is a theological application of the work rather than a comprehensive account of Van Gogh's artistic purposes.

The interpretation does not depend on identifying the figure of Christ as a self-portrait of the artist. Such an identification would require a separate examination of the relevant evidence. The educational discussion can instead begin with the religious subject and the details visible in the particular version of the painting selected for classroom use.

Students could first describe the figures, their relationship, and the composition. They could then consider how these details support a reading concerned with grief or compassion, before discussing the additional meanings introduced by a Christian account of sacrifice. This sequence makes the transition from observation to theological interpretation explicit.

4.5 Waterloo as a Starting Point for Reflection on Gratitude

The discussion of ingratitude between Napoleon and Ney in *Waterloo* (Bondarchuk, 1970) provides a different kind of example. The immediate context concerns political relationships and obligations. The author proposes using the exchange as a starting point for reflection on gratitude within a Christian framework.

The connection to SE is introduced by the interpreter: if gratitude concerns recognising what one has received, how might Christians understand gratitude in relation to life, grace, and the sacrifice of Christ? This question extends the discussion beyond the film's political setting. It does not establish that the filmmakers intended the exchange to communicate a Christian teaching.

The comparison also requires caution. Gratitude towards a political ruler and gratitude towards God cannot be assumed to carry identical obligations. Classroom discussion should therefore consider whether gratitude necessarily entails obedience, whether a benefactor's expectations are justified, and where the proposed theological comparison ceases to be useful.

These questions allow the example to support reasoned reflection rather than serve as a direct illustration of a predetermined religious conclusion.

4.6 A Proposed Classroom Procedure

The three examples support a proposed teaching procedure that makes observation, interpretation, and reflection distinguishable. The procedure has not been evaluated through student data in this article.

First, the teacher introduces the selected work and provides the contextual information necessary to understand it. Students describe what they see, read, or hear before being asked to identify a spiritual meaning.

Second, students propose interpretations and identify the details supporting them. The teacher asks them to distinguish information contained in the work from assumptions introduced by the viewer.

Third, the teacher introduces the relevant Christian concepts and biblical passages. Students consider how this framework changes their reading and whether the proposed connections are adequately supported. The teacher makes clear which claims concern the work's content, which concern documented intentions, and which are theological interpretations.

Fourth, the class compares the Christian reading with plausible alternatives. Disagreement becomes an opportunity to examine reasons and evidence. It should not be treated as proof of a student's spiritual deficiency.

Finally, students produce a short reflective response explaining an interpretation, its supporting details, and its limitations. Assessment can address the clarity of their reasoning, contextual understanding, and engagement with alternative readings. These responses should

not be presented as measurements of salvation or as demonstrated changes in spiritual development.

In Christian educational settings, this procedure may be placed within an explicitly shared religious purpose. In classrooms involving students with different beliefs, the teacher should distinguish understanding the Christian framework from affirming it. Students should be able to question an interpretation or articulate another perspective without being penalised for their religious position.

4.7 Educational scope and limitations

The author's earlier account places importance on the teacher's spiritual commitments and preparation (Totskyi, 2011). Within a Christian SE framework, these commitments help explain the purpose of the proposed educational practice. They do not replace careful preparation of sources, transparent interpretation, or respect for students' differing responses.

The examples illustrate ways of organising discussion around purification, suffering, sacrifice, and gratitude. They do not demonstrate that the proposed activities produce lasting moral change or movement through the levels of spiritual development discussed in the author's previous work (Totskyi, 2013, 2014).

Any subsequent evaluation would need to define the educational outcomes being investigated and distinguish them from theological claims about salvation. The contribution of the present discussion is limited to clarifying an interpretive approach and showing how it can inform proposed classroom activities.

5. Discussion and Implications for Educational Policy

5.1 Discussion

The central issue arising from the analysis is whether the Christian purpose of soteriological education can be maintained while allowing students to question the interpretations through which that purpose is expressed. Within SE, salvation gives education a theological orientation. However, this commitment does not by itself establish the meaning of a particular artwork or justify requiring students to reproduce the teacher's reading. The position advanced here is that a Christian interpretation can retain its theological character while making its reasoning available for examination.

The first objection concerns the application of Christian meanings to non-Christian works. Reading the Augean stables as an analogy of spiritual purification introduces a Christian interpretive framework that is not established as part of the myth's original meaning. The objection is valid if the analogy is presented as the narrative's original meaning. It does not necessarily invalidate a subsequent educational comparison. The distinction is between claiming what the myth originally signifies and asking what becomes visible when it is read alongside a Christian account of purification. The proposed comparison is defensible only insofar as its supporting details and limitations are made explicit.

This distinction also clarifies the problem of artistic intention. A Christian reading need not depend on claiming that an artist unconsciously communicated a religious message. Such a claim would require evidence beyond the interpreter's perception of a resemblance. The examples instead support a more limited argument: artistic content can become material for

theological reflection without establishing that the creator intended that application. Interpretive openness nevertheless does not make every reading equally persuasive. A proposed reading must explain its relationship to the work and address details that complicate it.

The second objection concerns the institutional legitimacy of SE in secular education. A Christian institution may articulate salvation as a shared educational purpose, whereas a secular institution cannot assume that all learners accept that purpose. The Toledo Guiding Principles situate teaching about religions and beliefs within concerns for accuracy, fairness, professional competence, and freedom of religion or belief (OSCE Office for Democratic Institutions and Human Rights [OSCE/ODIHR], 2007). These principles provide a relevant comparison for the present proposal, although they do not constitute an endorsement of soteriological education.

The implication developed here is that the purpose of an activity must be specified at the institutional level. Studying how a Christian reading is constructed is different from participating in education directed towards personal acceptance of that faith. Consequently, SE cannot be transferred unchanged from a confessional setting into a secular classroom merely by presenting it through art. In the latter setting, its Christian framework should become an explicitly identified subject of interpretation and discussion.

A possible criticism is that this adaptation weakens SE by replacing its concern with salvation with a general exercise in interpretation. This criticism identifies a genuine limitation. The classroom procedure proposed here does not reproduce the whole theological purpose of SE in every institutional setting. Rather, it distinguishes that purpose from the educational

activities that can be shared with learners who do not affirm it. The proposal therefore preserves a Christian perspective while limiting what an institution may assume about students' commitments.

The third issue concerns how disagreement is managed. Permission to disagree is insufficient if the teacher's preferred interpretation still determines assessment. Jackson's (2014) *Signposts* addresses moderated classroom dialogue and the inclusion of religious and non-religious world views. In relation to the present framework, these concerns support examining how discussion is organised, whose interpretations receive attention, and whether students can challenge the proposed analogy without academic disadvantage. The assessment criteria proposed in this article accordingly concern contextual understanding, supporting evidence, and reasoning rather than religious agreement.

This approach creates a further tension between theological aims and observable educational outcomes. Interpretive competence cannot demonstrate salvation, while agreement with Christian teaching cannot be assumed to demonstrate spiritual development. The classifications discussed in the author's earlier work therefore cannot function as established outcomes of the activities proposed here. An evaluation would need to examine defined educational outcomes while acknowledging that these do not exhaust the religious significance attributed to SE.

Finally, the examples do not demonstrate that emotional engagement with art produces lasting moral change. Their role is to show how reflection can be organised, not to establish its effects. The policy question is therefore not whether institutions should assume the

transformative power of spiritual art, but under what conditions they can responsibly pilot this proposed use. Clear purposes, transparent interpretation, appropriate teacher preparation, and assessable educational outcomes provide the basis for the policy implications developed in the following section.

5.2 Implications for Educational Policy

The discussion identifies a conditional basis for using the proposed framework in educational institutions. Its application depends on the institution's educational purpose, the responsibilities assigned to teachers, and the criteria used to evaluate learning. The policy proposal is therefore to develop and examine a defined teaching unit rather than adopt SE as a general requirement across educational systems.

Curriculum committees should first specify the purpose and setting of the unit. In a Christian institution, it may form part of an explicitly confessional programme. In a secular institution, the proposed activities should concern understanding and examining a Christian interpretation of art, with opportunities to consider other readings. This distinction should appear in learning objectives, teaching materials, and assessment criteria.

Teacher preparation should translate the interpretive framework into practical competences. Teachers need to verify contextual information, distinguish documented intentions from subsequent readings, and explain the details supporting a theological interpretation. They also need to facilitate disagreement without treating it as a failure of learning. These priorities connect with the professional preparation and classroom dialogue

addressed by OSCE/ODIHR (2007) and Jackson (2014), while their specific application to SE remains the proposal of this article.

Schools should establish assessment criteria before implementation. Student responses may be assessed for contextual accuracy, use of relevant details, clarity of reasoning, and engagement with alternative interpretations. Religious affirmation should not determine academic performance. Students should also be able to complete analytical tasks without disclosing personal religious commitments.

Implementation could begin with a limited pilot involving selected lessons and prepared teachers. School leaders and curriculum coordinators should review the suitability of the materials, teacher preparation requirements, and opportunities for students to question the interpretations presented. Where student data are collected for research, appropriate consent procedures and data safeguards would be required.

Evaluation should examine whether the activities meet their stated educational objectives and whether they are feasible in the chosen setting. Relevant evidence could include students' ability to distinguish factual claims from interpretation, support a reading with details from a work, and explain the limitations of an analogy. Such evidence would concern educational learning; it would not establish salvation or validate a classification of students' spirituality.

Decisions about continuation or expansion should depend on the pilot's findings. Revision may be necessary if materials obscure the distinction between interpretation and fact, assessment rewards religious agreement, or teachers lack the preparation needed to manage discussion. Wider application would require evidence of educational value and attention to the

institutional context. The framework thus offers a proposal for curriculum development and evaluation rather than a demonstrated policy solution.

6. Conclusions

This article has developed a conceptual framework for using selected artistic works within a Christian approach to soteriological education (SE). Its central argument is that theological commitment can guide reflection through art while the interpretations used in teaching remain explicit, supported by details in the work, and open to examination. The analysis distinguishes sacred subject matter, documented artistic intentions, and theological meanings introduced by an interpreter.

The Augean stables, Van Gogh's *Pietà*, and the exchange concerning ingratitude in *Waterloo* illustrate different relationships between artistic content and Christian reflection. Their educational application depends on explaining these relationships and examining their limitations. The proposed classroom procedure translates this requirement into observation, contextual understanding, supported interpretation, comparison of alternative readings, and reflection.

The discussion identifies a tension between the theological purpose of SE and the outcomes that educational institutions can assess. Salvation gives SE its Christian orientation, but interpretive understanding does not demonstrate salvation, and religious agreement should not determine academic performance. In settings involving different beliefs, the proposed activities therefore distinguish examining a Christian perspective from affirming it. This

distinction limits the institutional application of SE without denying its theological significance to those who share its commitments.

The policy implication is a conditional proposal for curriculum development. Institutions considering the framework should specify the purpose of its use, prepare teachers to distinguish evidence from interpretation, and establish assessment criteria that accommodate reasoned disagreement. A limited pilot could examine educational value and feasibility before decisions about wider application. The analysis supports these considerations for implementation; it does not establish the effectiveness of the proposed procedure.

No questionnaire findings or individual student analyses are reported. Further research should therefore investigate clearly defined educational outcomes, such as contextual understanding and the ability to justify and question interpretations, using appropriate instruments, transparent analysis, and relevant consent procedures. The article provides an interpretive framework and a proposed route from classroom practice to institutional evaluation, while leaving claims about spiritual transformation and the suitability of wider adoption open to further investigation.

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