Weaponized Interdependence: Assessing the Ripple Effects of the 4F Crisis on Emerging Economies

Parhlad Singh Ahluwalia, Dr. Bhim Rao Ambedkar Law University, Jaipur, Rajasthan, India

Abstract

Background: *The period from 2020 to 2023 produced a compound disruption in food, fuel, fertilizer and finance, the "4F crisis". It exposed how the dense networks that once promised efficiency can be turned into instruments of coercion and how their disruption spreads to economies that never took part in the underlying contest. This paper examines the crisis through the lens of weaponized interdependence, a framework that explains how states exploit their control over network hubs.*

Methods: *The study is a PRISMA-ScR-guided scoping synthesis with a comparative historical component. It screened a supplied thematic corpus of 117 records and added 39 sources identified by purposive citation chaining. Sixty-five sources were retained.*

Results: *Exposure to the 4F crisis was shaped less by the size of an economy than by the structure of its dependence. Concentrated import sourcing, dollar-denominated liabilities, thin fiscal space and prior climate or health stress determined outcomes. The evidence suggests that the 4F crisis was only partly the product of deliberate coercion. A large share of the harm came from collateral transmission, in which restrictions, sanctions, monetary tightening and export bans aimed at or triggered by great-power rivalry reached bystander economies through shared infrastructure. Export restrictions by third countries acted as a multiplier, as they did in 2007–08. Financial transmission through the dollar system turned a commodity shock into a balance-of-payments and debt shock.*

Conclusion: *Emerging economies are better described as structurally exposed bystanders than as targets. Resilience depends on diversifying sources and settlement channels, building buffers, and securing collective institutional protection. A four-stage model (exposure, transmission, amplification, adaptation) is proposed to guide analysis and policy, together with eight citable propositions.*

Keywords: *weaponized interdependence; 4F crisis; food security; energy security; fertilizer; sovereign debt; emerging economies; geoeconomics; global value chains*

1. Introduction

The global economy of the early 2020s was defined less by a single shock than by the interaction of several. Between the onset of the COVID-19 pandemic in 2020 and the cascading energy and food disruptions that followed Russia's full-scale invasion of Ukraine in February 2022, policymakers faced what senior United Nations officials described as a crisis of food, energy and finance unfolding at the same time [1]. In common usage the formulation has been widened to include fertilizer. The resulting shorthand, the "4F crisis" of food, fuel, fertilizer and finance, is the one adopted here.

The label matters analytically because the four domains are causally linked. Natural gas prices set the cost of nitrogen fertilizer. Fertilizer costs shape planting decisions and yields. Yields and trade policy determine food prices. Food and energy import bills drain foreign-exchange reserves and raise the premium on sovereign borrowing. Tighter global financial conditions then limit the ability of import-dependent governments to finance the very goods whose prices have risen. The human consequences were substantial: the most recent flagship assessment by the United Nations food and health agencies estimated that around 735 million people, or 9.2% of the world's population, faced hunger in 2022 [2]. Behind that aggregate lie many national stories of currency collapse, rationing, subsidy bills that governments could not afford and political instability.

This paper asks why those stories unfolded as they did, and it does so through the framework of weaponized interdependence. Farrell and Newman defined the concept as the capacity of states that

host critical nodes in global networks to exploit those nodes for strategic advantage, either by gathering information (the "panopticon effect") or by denying access (the "chokepoint effect") [3]. The intellectual lineage runs back to Hirschman's observation that asymmetric trade relations create power for the stronger party [4] and to Keohane and Nye's account of interdependence as a source of both cooperation and leverage [5]. The recent literature has since multiplied cases and cautions [6]. Related work has shown that weaponization is not confined to trade and finance. States now exploit digital infrastructure [7], reorganize supply chains in strategic competition [8], and use surveillance technologies in ways that shape the sovereignty of Global South states [10]. Even climate and environmental agreements are being read as instruments that redraw power blocs [11].

The central puzzle for emerging economies is that most of them were neither the intended targets nor the intended beneficiaries of the coercive moves that defined the period. They absorbed the consequences of sanctions, export bans and monetary tightening designed with other objectives in mind. A framework built to explain how powerful states coerce each other must therefore be extended to explain how coercion and counter-coercion radiate outward to third parties. Existing studies tend to treat food, energy and finance in isolation, or they analyse a single episode such as the Black Sea grain disruption. A smaller body of work treats the four channels as one connected system and evaluates the evidence across competing theoretical perspectives. This paper contributes by addressing three questions:

- **RQ1.** Through which channels did the 4F crisis transmit shocks from the centres of geopolitical conflict to emerging economies, and how does that transmission compare with earlier commodity and financial crises?
- **RQ2.** What does the existing body of research conclude about the relative importance of deliberate weaponization versus collateral transmission in explaining outcomes?
- **RQ3.** How do the main theoretical perspectives interpret the evidence, and what policy and research implications follow?

The contributions are fourfold. First, the paper offers a structured synthesis, reported using PRISMA-ScR principles, of the conceptual, empirical and regional literatures. Second, it places the 4F crisis in comparative perspective against the oil shocks of the 1970s and the food price crisis of 2007–08. Third, it proposes an analytical model and a set of propositions that later researchers can test or cite. Fourth, it gives the Global South vantage point on a literature that has been written mostly from the vantage point of the powerful. The paper proceeds as follows: Section 2 sets out the conceptual framework, Section 3 the method, Section 4 the anatomy of the crisis, Section 5 the comparative analysis, Section 6 the channel-by-channel evidence, Section 7 the review of related research and its outputs, Section 8 the competing perspectives, Section 9 policy implications, and Sections 10 and 11 the limitations and conclusions.

2. Conceptual Framework

2.1 From interdependence to weaponization

The classical liberal expectation was that trade and financial integration would dampen conflict by raising its cost. Hirschman's early work already undercut the simple version of that claim, arguing that dependence is distributed unevenly and that a state able to withdraw trade can extract concessions from a state that cannot easily replace it [4]. Keohane and Nye extended the point by showing that interdependence has "sensitivity" and "vulnerability" dimensions. Sensitivity measures how quickly a change in one place affects another, and vulnerability measures how costly it is to adjust once the change occurs [5]. The distinction remains useful for emerging economies, which are often highly sensitive to external price movements because of import dependence, and highly vulnerable because they lack the reserves, alternative suppliers or domestic substitutes needed to adapt.

Farrell and Newman reframed these ideas around network structure. Global economic networks, they argued, are not flat. Historical accidents, economies of scale and regulatory advantages concentrate traffic in a few hubs such as payment messaging systems, dollar clearing, cloud infrastructure, advanced semiconductors and shipping insurance [3]. States with jurisdiction over those hubs can observe flows and deny access to them. The theory predicts that coercive capacity is greatest where hubs are hard to bypass and where the coercer has the institutional means to use them. Subsequent contributors in the edited volume by Drezner, Farrell and Newman refined the argument. They stressed that the capacity to weaponize depends on domestic institutions, that targets can adapt, and that overuse can accelerate the search for alternatives [6].

2.2 Geoeconomics and economic statecraft

Weaponized interdependence belongs to a wider intellectual tradition of economic statecraft. Baldwin's classic treatment insisted that economic instruments be analysed as policy tools whose effectiveness depends on goals, targets and alternatives, not dismissed because sanctions have a mixed record [13]. Blackwill and Harris later argued that major powers increasingly pursue geopolitical aims through economic means such as trade policy, investment, sanctions, energy policy and financial regulation, and that the United States had under-invested in these tools relative to its rivals [12]. The geoeconomic literature thus supplies the motive and means. What it leaves relatively underdeveloped is the question of external effects, meaning how a measure designed to impose costs on one state transmits to others through shared infrastructure.

2.3 Global value chains as networks of dependence

The governance of global value chains offers another entry point. Gereffi, Humphrey and Sturgeon distinguished market, modular, relational, captive and hierarchical governance forms, arguing that the degree of power asymmetry between lead firms and suppliers depends on the complexity of transactions and the codifiability of information [14]. Most emerging economies sit in positions that are exposed to the decisions of lead firms and the states that regulate them. For staple foods, fertilizers and energy the relevant networks are often simpler but more concentrated: a handful of exporters, a handful of ports and a few shipping routes. In such networks, disruption at a single node can produce outsized effects.

2.4 The financial hierarchy

Financial interdependence is arguably the most asymmetric of all. Rey's work on the global financial cycle argued that capital flows, asset prices and credit growth across countries co-move with the monetary policy of the centre economy, which undermines the independence of peripheral monetary policy even under floating exchange rates [15]. Miranda-Agrippino and Rey provided empirical support, showing that US monetary policy shocks propagate through a global factor in risky asset prices, credit and capital flows [16]. The dominant currency literature adds a trade dimension. Gopinath and colleagues showed that when most trade is invoiced in dollars, exchange-rate movements of the dollar rather than bilateral rates drive import prices and trade volumes [18]. Gopinath and Stein linked this to banking, showing that the dollar's dominance in trade invoicing and in the supply of safe assets are mutually reinforcing [17]. For emerging economies the implication is stark. A tightening of US monetary conditions raises the local-currency cost of imported food and fuel at the same moment that it raises the cost of servicing external debt.

2.5 Beyond intention: collateral weaponization

The original formulation emphasised intentional exploitation of hubs. The 4F episode suggests the need for a broader concept. Farrell and Newman themselves later argued that weak links in finance and supply chains can be weaponized, and that the same structural features that enable coercion make the system fragile for everyone [19]. Mulder's historical account of sanctions shows how economic warfare came to be institutionalised as a standard instrument of great-power conflict, with consequences for

neutral parties that were long underestimated [20]. Other recent work extends the logic to the digital domain, showing how states exploit internet infrastructure for coercion [7], to technology supply chains and the strategic competition between the United States and China [8], and to the sovereignty implications of digital infrastructure for developing countries [10]. Climate governance is also now interpreted as a field in which environmental agreements reshape power alignments [11].

This paper therefore distinguishes three modes of harm to emerging economies:

- **Direct weaponization**, in which an emerging economy is itself the target of coercion.
- **Instrumental weaponization of third-country dependence**, in which a great power exploits the reliance of third countries on its exports (food, fertilizer, energy) as a source of leverage or diplomatic influence.
- **Collateral transmission**, in which measures aimed at others, together with defensive responses by other states, spill over to bystanders through shared prices, shipping routes, payment channels and capital markets.

The evidence reviewed below suggests that the third mode accounts for a larger share of the observed damage than the first two.

2.6 An analytical model: exposure, transmission, amplification, adaptation

To organise the evidence, the paper proposes a four-stage model. **Exposure** refers to the structural position of an economy: concentration of import sources for key commodities, the share of essential goods in consumption and import bills, the currency composition of debts, and the stock of reserves. **Transmission** refers to the channels through which an external shock reaches the economy: prices, quantities, exchange rates, credit conditions and information. **Amplification** refers to mechanisms that enlarge the shock, such as third-country export restrictions, speculative behaviour, domestic institutional weakness and compounding natural or health shocks. **Adaptation** refers to the capacity to respond through diversification, buffers, substitution, social protection and international support. The model is simple by design, so that it can be applied across cases and tested against the evidence synthesised below.

3. Methodology

3.1 Design

The study is a scoping synthesis guided by the PRISMA 2020 statement [21] and its scoping-review extension, PRISMA-ScR [22]. The choice follows from the nature of the question. The 4F literature is dispersed across political science, development economics, agricultural economics, energy studies, international finance and regional studies, and it uses heterogeneous designs and units of analysis. A conventional meta-analysis is therefore not feasible. A scoping design is better suited to mapping the breadth of evidence, identifying conceptual convergences and gaps, and presenting the findings transparently [22]. The rationale for structured transparency in scoping work, and the practical steps involved for emerging researchers, are discussed in two recent methodological treatments [23, 24]. The present study follows their emphasis on explicit eligibility criteria, documented source selection and a clear account of limitations.

3.2 Eligibility criteria

Sources were eligible if they (a) addressed weaponized interdependence, economic statecraft or the structure of global economic networks; (b) analysed food, energy, fertilizer or financial transmission of shocks, with relevance to emerging or developing economies; (c) offered comparative or historical evidence on earlier commodity or financial crises; or (d) offered thematic evidence on compounding factors in emerging economies, such as climate stress, health burdens, labour precarity, migration or

information environments. Eligible source types were peer-reviewed articles, scholarly monographs, and flagship reports of multilateral institutions. The language of inclusion was English, with one Hindi-language item retained on grounds of regional relevance.

3.3 Information sources and selection

Sources came from two streams. The first was a supplied thematic corpus of 117 records. The second was a set of 39 sources identified by purposive citation chaining outward from the core weaponized-interdependence literature and from the flagship publications of the United Nations system, the International Monetary Fund, the World Bank, the International Energy Agency and UNCTAD. Because the corpus was assembled purposively and not through exhaustive database retrieval, a conventional PRISMA flow diagram with database-level record counts is not reported. The selection stages are described in the following text.

All 117 records in the supplied corpus were screened by title and, where available, abstract. Ninety-one were excluded: 90 because their subject matter (for example clinical practice, philosophical traditions, education policy and accreditation, or legal doctrine) lay outside the scope of the research questions, and one (record 117) because it lacked adequate bibliographic information. Twenty-six records were retained on thematic relevance. These are used in this paper in the manner their titles and scope support: as regional and thematic evidence on geopolitical weaponization, supply-chain competition, climate and disaster stress, health burdens, labour precarity, information environments and methodological practice. They are not used to support empirical claims beyond what their stated subject matter justifies. Together with the 39 externally identified sources, the final evidence base comprises 65 sources.

3.4 Data charting and appraisal

For each retained source the following were charted: the type of evidence, the unit of analysis, the channel addressed (food, fertilizer, fuel, finance, or compounding factors), the main finding or contribution, and the theoretical perspective implied. In keeping with scoping-review practice, no formal risk-of-bias scoring was applied. Instead sources were assigned to three tiers: Tier 1, peer-reviewed empirical work and official statistical or institutional reports; Tier 2, foundational conceptual and historical works; and Tier 3, regional and thematic analyses used to illustrate compounding stressors. Quantitative claims in this paper rest on Tier 1 sources. Tier 3 sources inform the interpretive discussion but not the numerical estimates.

3.5 Synthesis

Synthesis was narrative and thematic, organised around the four channels of the analytical model and supplemented with a comparative historical analysis of three episodes: the 1970s oil shocks, the 2007–08 food price crisis and the 2022 4F crisis. Divergent findings are reported and discussed instead of averaged.

3.6 Ethics and originality

The study used published sources only. Reporting followed accepted norms in social science research regarding accuracy, attribution and avoidance of misrepresentation [25]. To ensure originality, all source material has been paraphrased and attributed, and no passage is reproduced from any source. Practical guidance on building originality into the writing process and on the role of detection tools is available in the literature [26, 27]. Authors planning submission should still run the final manuscript through institutional similarity-checking software, since no author can verify originality against every database.

4. Anatomy of the 4F Crisis

4.1 The pandemic prelude

The 4F crisis did not begin in February 2022. The COVID-19 pandemic had already reduced incomes, disrupted logistics and prompted governments to hold more precautionary stocks of food. Modelling exercises early in the pandemic projected substantial increases in global poverty and food insecurity under plausible scenarios, with the poorest households and the most import-dependent economies facing the sharpest deterioration [28]. The recovery that followed produced its own imbalances. Demand rebounded faster than supply chains could adjust, freight costs rose, and energy and agricultural commodity prices had begun to climb well before the invasion. The pandemic thus lowered the buffers of many emerging economies in terms of fiscal space, reserves and household savings, and set the stage for the next shock.

4.2 The war shock and food markets

Russia's invasion of Ukraine struck markets in which both countries are major exporters of wheat, maize, sunflower oil and, in Russia's case, fertilizer and energy. The United Nations Global Crisis Response Group identified dozens of developing countries that relied on Russia and Ukraine for a substantial share of their wheat imports, and warned that disruption of Black Sea shipping, higher energy prices and tighter financial conditions would interact to push millions of additional people into food insecurity [1]. Reviews of the supply-chain implications confirmed that the disruption operated through multiple routes: lost or delayed exports from Ukrainian ports, input-cost increases for farmers, and logistical frictions in alternative routes [29]. UNCTAD's early assessment likewise emphasised that the effects would reach developing countries through prices, trade and finance, with the most vulnerable being low-income food importers [30].

A partial mitigation arrived in July 2022 with the Black Sea Grain Initiative, a United Nations- and Türkiye-brokered arrangement that allowed Ukrainian grain exports to resume by sea under inspection [31]. Its eventual lapse in 2023 re-exposed the fragility of reliance on a single negotiated corridor. The FAO Food Price Index, which tracks a basket of internationally traded food commodities, reached its highest recorded level in March 2022, at approximately 160 points on its 2014–16 base, before easing through the rest of the year [32].

4.3 Fertilizer

The fertilizer channel is less visible but arguably more consequential for the medium term. Russia and Belarus are major exporters of potash, nitrogen and compound fertilizers, and natural gas is a principal feedstock for nitrogen products. Modelling by Alexander and colleagues suggested that high energy and fertilizer prices, rather than the curtailment of food exports from Ukraine and Russia, would be the more damaging driver of food prices, health outcomes and environmental impacts, because input costs reduce application rates and yields across many producing countries [33]. This finding shifts attention from the headline question of Black Sea grain to the structural issue of input dependence. Smallholder farmers in South Asia and Sub-Saharan Africa, who lack hedging instruments and credit, are particularly exposed when fertilizer prices spike.

4.4 Fuel

In energy, the invasion triggered a repricing of risk across oil, gas and coal markets and a reorientation of trade flows. The International Energy Agency described the episode as the first truly global energy crisis, with Europe's rush to replace Russian pipeline gas bidding up liquefied natural gas (LNG) prices and diverting cargoes away from price-sensitive importers in South Asia [34]. The World Bank assessed that the surge in energy prices was the largest commodity price shock since the 1970s, with Brent crude exceeding US$120 per barrel in the spring of 2022 [9]. Emerging economies were therefore squeezed

twice: once by higher crude prices, and again by the loss of access to LNG that wealthier buyers could outbid them for.

4.5 Finance

The financial channel linked the other three. Central banks in advanced economies, confronting inflation partly driven by the commodity shock, tightened monetary policy rapidly. The US Federal Reserve raised its policy rate by 425 basis points during 2022, and the dollar strengthened to levels not seen in two decades, raising the local-currency cost of imports and external debt service for most emerging economies [35]. According to the World Bank, developing countries' external debt service reached a record level in 2022, at roughly US$443 billion for low- and middle-income countries [36]. UNCTAD estimated that some 3.3 billion people lived in countries that spent more on interest payments than on health or education [37]. Historical research on debt crises has long warned that the combination of external borrowing, commodity-price vulnerability and sudden shifts in global liquidity conditions is the classic precursor of default [38]. The post-2022 experience was consistent with that warning, and several emerging economies faced default, restructuring or emergency financing from the International Monetary Fund.

5. Comparative Analysis: Three Episodes of Commodity-Led Disruption

5.1 The 1970s oil shocks

The oil shocks of 1973–74 and 1979 are the original case of an energy commodity used, at least partly, as an instrument of political leverage. Hamilton's classic analysis found that oil price increases preceded most US recessions in the postwar era, establishing the macroeconomic significance of energy price shocks [39]. For oil-importing developing countries of the 1970s, the shock operated through the current account and was financed largely by recycled petrodollar lending, which later fed the debt crises of the 1980s. The key lesson relevant to 2022 is the sequence: an energy price shock, financed through external borrowing, followed by monetary tightening in the centre, and then a debt crisis in the periphery. The same sequence reappeared in compressed form after 2022.

5.2 The 2007–08 food price crisis

The 2007–08 food crisis is the closest analogue to the food dimension of the 4F episode, and its literature offers the strongest evidence on amplification. Headey argued that trade shocks, meaning export restrictions and other policy responses, played a central role in the price spike, alongside demand and macroeconomic factors [40]. Martin and Anderson estimated that insulating policies, in which exporting countries restricted exports and importing countries cut tariffs, accounted for a substantial share of the rise in world prices, roughly 45% for rice and 30% for wheat [41]. Giordani, Rocha and Ruta documented a multiplier effect, whereby export restrictions by some countries raise prices and induce further restrictions by others, so that the aggregate impact exceeds the sum of individual decisions [42]. This is a collective-action problem in which each government's rational defensive move worsens the global outcome.

5.3 The 2022 episode

The 2022 episode replicated this dynamic. The IFPRI tracker of food and fertilizer export restrictions recorded restrictions by more than twenty countries during 2022, at their peak covering roughly one-sixth of globally traded calories [43]. Notable instances included Indonesia's temporary ban on palm oil exports in April–May 2022, India's prohibition on wheat exports in May 2022, and, after the period of acute crisis, India's restrictions on non-basmati white rice exports in July 2023 [43]. These measures were defensible from a domestic standpoint, since governments facing inflation and electoral pressure prioritise domestic consumers. Yet they illustrate the logic of collateral transmission: no state needed to intend harm to bystanders for bystanders to be harmed.

5.4 What differs, and what does not

Three differences stand out. First, the 2022 episode combined energy, food and fertilizer shocks with a rapid monetary tightening cycle and a stronger dollar, which was not the case in 2007–08, when the financial crisis produced a different pattern of capital flows and policy responses. Second, the 2022 shock originated in a conflict directly involving a major nuclear power and a major exporter of the very commodities in question, so that explicit instruments of financial warfare were deployed on a scale not seen before, including the exclusion of Russian banks from international payment messaging, the immobilisation of central bank reserves and the oil price cap [20]. Third, the information environment was more saturated and more contested, so that narratives about responsibility for food insecurity became part of the contest itself.

Three features persist across all episodes. Import-dependent emerging economies with limited reserves are consistently the most affected. Third-country policy responses amplify the initial shock. And the financing channel determines whether a price shock becomes a crisis. These regularities support the view that the structure of interdependence, more than the specific identity of the instigator, determines which economies suffer most.

6. Channel-by-Channel Evidence and Country Experience

6.1 Food: concentration, substitution and household effects

Dependence on a narrow set of exporters is the defining food vulnerability. The UN assessment documented that a large group of low- and middle-income countries sourced more than a third, and in some cases more than half, of their wheat from Russia and Ukraine [1]. Egypt, one of the world's largest wheat importers, illustrates the interaction of food dependence and financial vulnerability. Higher wheat prices coincided with capital outflows and pressure on the currency, which raised the local cost of imports at the very moment the state needed foreign exchange most [35].

Household-level responses compound the macro picture. Evidence on consumer behaviour in food markets indicates that demand-side adaptation, such as shifting between product categories and price tiers, is an important mechanism by which price shocks translate into dietary outcomes [44]. In low-income settings, such substitution often means a move toward cheaper and less nutritious calories, which produces lasting effects on health and productivity even after prices stabilise.

6.2 Climate and disaster stress as an amplifier

A recurring theme in the Asian context is that the 4F shock arrived in regions already coping with severe climate hazards. Multi-dimensional assessments of floods in Asian countries document the interplay of climate change, urbanisation and socioeconomic factors in producing disaster risk, as well as the economic, social and environmental costs of floods and the vulnerability of populations and infrastructure [45, 46, 47]. A further analysis addresses the health consequences of floods and the vulnerability of healthcare infrastructure [48]. These studies establish, at a thematic level, that disaster stress erodes the capacity to absorb additional shocks.

Pakistan provides the sharpest illustration. The catastrophic floods of 2022 struck as the country was already confronting high import prices, depleted reserves and political uncertainty. The government's post-disaster needs assessment, prepared with international partners, estimated combined damages and economic losses exceeding US$30 billion, with recovery needs of a similar order [49]. The floods destroyed crops and livestock, undercutting domestic food supply at the moment when the global food market was least able to supply substitutes. The case shows how a natural shock can convert a manageable external imbalance into a systemic emergency. Climate-induced displacement adds a further dimension, since migration into already fragile urban areas in South Asia increases pressure on housing, services and food systems [50].

6.3 Fuel: windfalls, discounts and the limits of arbitrage

Energy exposure varied widely. LNG-dependent importers such as Pakistan and Bangladesh were the most exposed, because spot cargoes were bid away by higher-income buyers and the result was load-shedding and industrial disruption [34]. Other economies were able to exploit new opportunities. India sharply expanded its purchases of discounted Russian crude, which rose from a marginal share of its imports before 2022 to a substantial share thereafter, thereby cushioning its import bill and the domestic fuel price [51]. This arbitrage was possible because India had refining capacity, a diversified relationship with multiple suppliers, and sufficient diplomatic latitude to resist pressure from either bloc. It was also facilitated by institutional innovation in payments, such as the Reserve Bank of India's July 2022 framework permitting international trade invoicing and settlement in rupees [53].

India's experience also illustrates the broader dynamics of dependence on the wider neighbourhood. Studies of India–China relations emphasise that opportunities for economic engagement coexist with strategic challenges, so that dependence on a large neighbouring supplier of intermediate goods is simultaneously a source of cost advantage and a source of exposure [52]. The strategic decoupling between the United States and China has meanwhile reshaped the global supply chain, creating both opportunities for relocation to emerging economies and risks of being drawn into the contest [8]. The lesson is that diversification does not mean abandoning any single supplier; it means keeping a credible set of options.

6.4 Fertilizer: the slow-burning channel

Fertilizer shocks are slower to appear but more durable. Because application decisions are made before harvest, and because the cost of inputs affects the whole planting cycle, a price spike in one year can depress output in the next. The modelling evidence suggests that the aggregate effect of high input prices on food prices and food security could exceed that of export curtailment [33]. The distributional effect is regressive: large commercial farmers can hedge, store inputs or switch crops, whereas smallholders may cut application or abandon planting. Governments that subsidise fertilizer, as India and several others do, face a fiscal burden that rises with global prices, which feeds back into the financial channel.

6.5 Finance: from commodity shock to balance-of-payments crisis

The financial channel is where a price shock becomes a systemic event. A higher import bill widens the current-account deficit at the same time that a stronger dollar and rising US yields reduce capital inflows and raise refinancing costs. Sri Lanka is the clearest case. Following years of accumulated external vulnerabilities, the country suspended external debt payments in April 2022 amid acute shortages of fuel, food and medicine, and subsequently negotiated an IMF-supported programme [56]. The Sri Lankan case should not be read as caused solely by the 4F shock, since domestic policy errors and prior debt accumulation were central. It does show how external shocks expose underlying fragilities.

Another dimension is the interaction between financial pressure and social outcomes. Evidence from India on health disparities within a single state illustrates how structural inequities and legislative gaps shape which populations bear the burden when public budgets are strained [57]. When governments with high interest payments must choose between debt service and social spending, the burden falls on the groups least able to protect themselves.

Disease burden adds to this pressure. Analyses of disease patterns and epidemiological transitions in India document the scale of public health challenges that compete for fiscal resources [64, 65]. A macroeconomic shock that coincides with a heavy disease burden reduces the fiscal and institutional space available for response. Lessons from health systems on crisis leadership and organisational learning from pandemic failures also apply to economic governance: institutions that learn from earlier crises adapt faster to later ones [62].

6.6 Labour, platforms and precarity

The social impact of price shocks depends on how people earn their living. Studies of the gig economy emphasise the erosion of worker identity and security in precarious labour markets [54], and work on platform poverty examines the consequences of algorithmic invisibility for gig workers [55]. For emerging economies with large informal and platform-mediated workforces, the combination of rising living costs and unstable earnings can quickly reduce purchasing power. Workers with no contractual protection or social insurance cannot smooth consumption when prices rise, which magnifies the welfare effect of an external shock.

6.7 The information environment and the contest over narratives

A final channel is informational. Prolonged exposure to crisis-related media is associated, in the literature on doomscrolling, with cognitive overload and mental fatigue [58]. In the economic domain, the proliferation of competing narratives about who is responsible for food and energy shortages shapes public opinion and political outcomes. Work on the weaponization of nostalgia and political mythmaking shows how states and movements mobilise historical memory and identity to build narrative support for policy [59]. In the 4F context, both Western and Russian official narratives sought to attribute the food crisis to the other side, and each found audiences in emerging economies. Governments in those economies faced a delicate balancing act: avoiding alignment that would invite retaliation while managing public perceptions of who was to blame for shortages.

6.8 A provisional typology of exposure

Drawing the case evidence together, four broad profiles can be distinguished:

- **Food-and-finance exposed importers** (for example Egypt and several Sub-Saharan African economies), combining concentrated food imports with limited reserves and high external debt.
- **Energy-exposed importers** (for example Pakistan and Bangladesh), where the loss of access to affordable LNG disrupted power and industry.
- **Disaster-compounded economies** (for example Pakistan in 2022), where climate shocks magnified the external shock.
- **Diversified middle powers** (for example India), which had sufficient scale, diversified partners and policy latitude to arbitrage between blocs, although they too faced inflation and used export restrictions to protect domestic consumers.

These profiles are heuristic and should not be treated as fixed categories, since several countries fit more than one.

7. Review of Related Research: Findings and Outputs

This section synthesises the principal studies identified in the review, summarising their findings and what each contributes to the argument. It is organised by theme.

7.1 Conceptual foundations

Farrell and Newman (2019) developed the central theory of weaponized interdependence. Their output is a framework in which network hubs generate panopticon and chokepoint effects, and in which the capacity to coerce depends on both structural position and domestic institutions [3]. The contribution is explanatory: it moves beyond the claim that trade creates dependence to identify how dependence is operationalised. A limitation, acknowledged by later work, is its focus on state-to-state coercion between powerful actors, with less attention to third parties.

Drezner, Farrell and Newman (2021) assembled case studies and critiques. The collection's output is a set of refinements: states differ in their capacity to weaponize, targets can adapt, and overuse risks eroding the very network position on which leverage depends [6]. Together with the later argument that weak links in finance and supply chains are easily weaponized [19], these works establish that the system's fragility is a structural feature and not an accident.

Baldwin (1985) and **Blackwill and Harris (2016)** provide the statecraft background. Baldwin's output is a method for assessing the effectiveness of economic instruments in relation to goals and alternatives [13]. Blackwill and Harris contribute the argument that geoeconomic instruments have become central to great-power competition [12]. **Mulder (2022)** supplies the historical account of sanctions as an instrument of modern war [20].

7.2 Food and trade policy

Laborde, Martin and Vos (2021) modelled the effects of the pandemic on poverty, food security and diets. Their results indicate that shocks to incomes and food systems can produce significant increases in poverty and food insecurity, with the greatest effects on the poor [28].

Headey (2011) examined the 2007–08 food price crisis and concluded that trade shocks played a major role in the price surge [40]. **Martin and Anderson (2012)** quantified this, estimating that insulating trade policies explained roughly 45% of the rice price increase and 30% of the wheat price increase [41]. **Giordani, Rocha and Ruta (2016)** found a multiplier effect of export policy on food prices [42]. The consistent output across these three studies is that policy responses by third countries amplify price shocks well beyond their original sources.

Jagtap and colleagues (2022) reviewed the implications of the Russia–Ukraine conflict for global food supply chains and identified disruptions in trade flows, input supply and logistics [29]. **UNCTAD (2022)** highlighted vulnerability among developing-country importers [30], and the **UN Global Crisis Response Group (2022)** documented the import-dependence of dozens of countries and the interaction of food, energy and finance [1].

7.3 Energy and fertilizer

Alexander and colleagues (2023) produced the study most directly relevant to the fertilizer channel. They found that high energy and fertilizer prices would be more damaging for food prices, health and the environment than the curtailment of food exports from Ukraine and Russia [33]. This finding reorients policy attention toward input markets. The **International Energy Agency's** assessments describe the crisis as a global energy shock, with LNG diversion hurting South Asian importers [34] and with the redirection of Russian crude toward Asian buyers [51]. **Hamilton (1983)** supplies the historical benchmark, showing the macroeconomic significance of oil price increases [39].

7.4 Finance and debt

Rey (2013) and **Miranda-Agrippino and Rey (2020)** found that US monetary policy shapes a global financial cycle, which limits the policy autonomy of other economies [15, 16]. **Gopinath and colleagues (2020)** and **Gopinath and Stein (2021)** showed that dollar dominance in trade invoicing and finance transmits dollar movements into import prices and trade volumes [17, 18]. **Reinhart and Rogoff (2009)** documented the recurrent pattern of debt crises in historical data [38]. The **World Bank (2023)** and **UNCTAD (2023)** report record debt service and heavy interest burdens in developing countries [36, 37], and the **IMF (2022)** analysed the cost-of-living crisis and the effects of tightening [35]. The output of this literature is a coherent account of how the financial channel converts commodity shocks into balance-of-payments stress.

7.5 Regional and thematic studies

The corpus-derived thematic studies are largely analytic and descriptive; they are used here to establish context and mechanisms, not precise magnitudes. Ahluwalia's studies of cyber-diplomacy [7], of US–China decoupling [8], of techno-authoritarianism and sovereignty in the Global South [10], and of climate agreements and power blocs [11] together broaden the notion of weaponization beyond traditional trade and finance. The flood studies [45, 46, 47, 48] and the work on climate-induced displacement [50] document hazard-related vulnerability in Asia. The studies on gig work and platform poverty [54, 55], on health disparities and disease burden [57, 64, 65], on crisis leadership [62], and on trauma among displaced populations in conflict settings [63] illuminate the human and institutional dimensions of crisis.

7.6 Convergences and divergences

Four convergences emerge. First, the structure of dependence, and not the size of the economy, is the strongest predictor of exposure. Second, third-country policy responses are a major amplifier. Third, the financial channel is decisive for whether shocks become crises. Fourth, compounding stressors such as climate hazard, disease burden and labour precarity lower the threshold at which a shock becomes a catastrophe.

Two divergences remain. The first concerns the relative weight of food export curtailment versus input costs, where the modelling evidence [33] challenges the headline emphasis on Black Sea grain. The second concerns intent. The weaponization literature stresses deliberate exploitation of hubs [3, 6], while the trade-policy literature emphasises unintended spillovers [40, 41, 42]. This paper suggests that both are right and describe different segments of the transmission process.

8. Analysis from Different Perspectives

8.1 The realist and geoeconomic perspective

For realist and geoeconomic scholars, the 4F crisis confirms that economic interdependence is a terrain of power competition. Sanctions on Russia, the oil price cap and the immobilisation of central bank reserves represent the exercise of chokepoint power by the holders of financial hubs [3, 20]. Russia's interruption of gas supplies to Europe and its use of the Black Sea blockade represent the exploitation of its own positions in energy and grain markets [1, 34]. From this vantage point, emerging economies are arenas of competition for access, influence and alignment. The perspective explains the intensity of diplomatic courtship that major powers directed at the Global South during the period. Its weakness is that it can understate the agency of middle powers and treat third-country harm as a side-effect rather than a structural feature [12, 13].

8.2 The liberal-institutionalist perspective

Liberal institutionalists emphasise that the same networks that can be weaponized also deliver enormous gains, and that rules-based institutions can limit abuse. The Black Sea Grain Initiative, brokered by the United Nations and Türkiye, is evidence that cooperation is possible even amid war [31]. Keohane and Nye's account of complex interdependence anticipates both the sensitivity of states to each other's policies and the possibility of institutional management [5]. The weakness of this perspective in 2022–23 is evident: the initiative was temporary, export restrictions proliferated despite World Trade Organization disciplines, and the multilateral architecture proved unable to coordinate a collective response to input and debt problems [42, 43]. The liberal perspective remains valuable as a normative guide to reform, but it cannot by itself explain the observed outcomes.

8.3 The structuralist and dependency perspective

Structuralist scholarship, rooted in Prebisch's analysis of the unequal relationship between industrial centres and primary-producing peripheries [60], reads the 4F crisis as a contemporary expression of long-standing asymmetries. Emerging economies are price-takers in commodity and financial markets, they carry liabilities denominated in the currencies of the centre, and their policy space is constrained by the global financial cycle [15, 16, 18]. The record debt-service burdens documented by the World Bank and UNCTAD [36, 37] fit this reading well. The framework's explanatory limit is heterogeneity. Some peripheral economies, such as India, exploited diversification and arbitrage in ways that a deterministic dependency account would not predict.

8.4 The Global South agency and decolonial perspective

A growing body of scholarship insists that Global South states and societies be treated as agents and knowers and not merely as recipients of shocks. Work on decolonising sociology advocates that indigenous epistemologies and non-Western categories be incorporated into social theory [61]. Applied to the 4F crisis, this perspective questions the vocabulary of "spillover" and "bystanders", which positions emerging economies at the margins of a story that is, in fact, about the global system as a whole. It also draws attention to the sovereignty implications of dependence on foreign digital and financial infrastructure [10]. The perspective strengthens the argument for treating resilience as a matter of sovereignty and voice, including representation in the institutions that set the rules of the system. Its limitation is that it can underplay the material constraints that bind even autonomous states.

8.5 The sceptical perspective

Sceptics doubt that weaponized interdependence is as powerful as claimed. They argue that targets adapt, that sanctions rarely achieve maximalist goals, and that the overuse of financial hubs may accelerate de-dollarisation and the construction of parallel systems [6]. There is evidence supporting this reading: India's rupee settlement arrangement [53], the redirection of Russian energy exports toward Asian buyers [51], and the broader search for alternatives all suggest adaptation. Yet the sceptical view should not be overstated. Adaptation takes time, and the interim costs are borne disproportionately by the economies least able to adjust. The sceptics are right about the long run, but emerging economies live in the short run.

8.6 The narrative and information perspective

A final perspective treats the crisis as also a contest over meaning. Governments, media and movements compete to assign blame for shortages, and these narratives can be mobilised for political ends [59]. A saturated information environment also affects public psychology and decision-making [58]. For emerging economy governments, the narrative environment shapes the political cost of policy choices such as export restrictions, subsidy changes and alignment decisions. This perspective complements the material analyses by explaining why actors with similar interests make different public claims.

8.7 Integrative assessment

No single perspective is sufficient. The realist account explains why hubs were weaponized, the liberal account why cooperation was possible but fragile, the structuralist account why peripheral economies were exposed, the Global South account why the question of voice matters, the sceptical account why long-run adaptation is likely, and the narrative account why interpretation remained contested. The integrative position adopted here is that weaponized interdependence is best understood as a multi-level phenomenon, in which deliberate coercion at the centre interacts with structural asymmetry and defensive third-country policy to generate outcomes at the periphery.

9. Propositions and Policy Implications

9.1 Analytical propositions

The synthesis supports eight propositions, offered in a form that can be tested, refined or cited:

- **Proposition 1.** Exposure to the 4F crisis is a function of the structure of dependence (concentration of sources and settlement channels), not of national income alone.
- **Proposition 2.** Collateral transmission accounts for a larger share of harm to emerging economies than direct coercion.
- **Proposition 3.** Third-country export restrictions function as a multiplier of initial commodity shocks, and the multiplier is stronger when stocks are low and information is poor [41, 42].
- **Proposition 4.** Input costs (energy and fertilizer) are a more durable driver of food insecurity than the interruption of export volumes [33].
- **Proposition 5.** The financial channel determines whether a commodity price shock becomes a balance-of-payments or debt crisis [15, 16, 35].
- **Proposition 6.** Compounding stressors (climate hazard, disease burden, labour precarity) lower the threshold at which an external shock becomes a social emergency [45, 49, 54, 64].
- **Proposition 7.** Diversification of sources and settlement channels increases resilience only when accompanied by domestic buffers, namely reserves, storage and refining or processing capacity [51, 53].
- **Proposition 8.** Collective institutional arrangements reduce the cost of adaptation for small and fragile economies, but their effectiveness depends on their permanence and their financing [31, 36].

9.2 Policy implications for emerging economies

Diversify sources and payment channels. The evidence on India's adaptation suggests that a credible set of alternatives, including alternative suppliers and local-currency settlement, increases bargaining power and cushions shocks [51, 53]. Diversification should be treated as an insurance premium whose cost is justified by avoided losses in crisis periods.

Build physical and financial buffers. Strategic grain reserves, fertilizer stocks and foreign-exchange reserves allow time for adjustment. The risk of export restriction contagion implies that importers should hold buffers sized for the possibility that no one will sell during a crisis [41, 42].

Strengthen input resilience. Because input costs drive output, policy should support nutrient-use efficiency, domestic or regional fertilizer production where economical, and soil-health programmes that reduce dependence on imported nutrients [33].

Protect the vulnerable through targeted social protection. The distributional evidence implies that well-targeted transfers and school-feeding programmes are more effective than untargeted price subsidies, which are fiscally costly and regressive. Policy design should address the specific vulnerability of workers in precarious and platform-mediated employment [54, 55].

Integrate climate and disaster risk into macro-planning. The Asian flood literature and the Pakistan case show that disaster events compound external shocks [45, 46, 47, 49]. Contingent financing, parametric insurance and resilient infrastructure should be part of macroeconomic frameworks.

Invest in institutional learning. Lessons from healthcare crisis leadership suggest that organisations that document and learn from failures adapt more quickly [62]. Economic ministries and central banks can adopt similar practices, including post-crisis reviews and standing coordination mechanisms.

9.3 Implications for the international system

At the international level, the evidence points to four priorities. First, restraint on export restrictions in food and fertilizer, coupled with transparent information systems, would reduce multiplier effects [42, 43]. Second, a more predictable and faster debt-restructuring process would reduce the duration of financial distress, given the record burdens documented by international institutions [36, 37]. Third, exemptions and safeguards that keep food and fertilizer trade flowing during sanctions episodes need to be both clear in law and credible in practice, because financial and insurance compliance can chill trade even where it is formally permitted [20]. Fourth, greater voice for emerging economies in the institutions that govern trade, finance and technology is a precondition for legitimacy and for better design [10, 61].

10. Limitations and Future Research

The study has several limitations. First, the scoping design, while suited to mapping a dispersed literature, does not permit formal quantification of effect sizes, and no meta-analysis was performed. Second, because the corpus was assembled purposively and not through exhaustive database searching, some relevant studies may have been missed, and a PRISMA flow diagram of database retrieval is not reported. Third, the corpus-derived regional and thematic studies are largely analytic and are used for context and mechanisms, not for estimating magnitudes; the quantitative claims rest on institutional reports and peer-reviewed empirical work. Fourth, the crisis continues to evolve, and data for later years are less complete than for 2022–23. Fifth, the typology of country exposure is heuristic and based on selected cases; it should be validated on larger samples.

Future research could pursue several directions. Cross-country econometric work could test Propositions 1 to 5 using consistent measures of import concentration, invoicing currency, reserve adequacy and debt composition. Micro-level studies could trace the household and labour-market effects of the 4F shocks, especially for gig and informal workers. Comparative research could examine why some emerging economies managed to arbitrage between blocs while others could not. Finally, research on the institutional design of collective buffers, such as regional food reserves, regional swap arrangements and food-import financing facilities, would help translate the diagnostic findings into practice.

11. Conclusion

The 4F crisis was not simply a story of great powers weaponizing the interdependence on which the world economy rests. It was also a story of how deeply that weaponization, together with the defensive responses it provoked, reached economies that neither sought the contest nor controlled any of the hubs through which it was waged. For emerging economies, the central lesson is that exposure is structural. It is created by concentration in import sourcing, by dollar-denominated liabilities, by thin buffers and by compounding vulnerabilities such as climate hazard and disease burden. It is not a matter of national poverty alone.

The comparative evidence shows continuity with earlier episodes. As in the 1970s, an energy shock was financed through borrowing and followed by tightening in the centre. As in 2007–08, export restrictions by third countries multiplied the initial price shock. What was new in 2022 was the scale and openness of financial instruments of coercion, the speed of monetary tightening, and the density of the information contest that accompanied the economic one.

The policy conclusion is balanced. Emerging economies can improve their position through diversification, buffers, input resilience, targeted social protection and institutional learning, but they cannot do so alone. Collective restraint on export bans, more reliable debt-restructuring processes and safeguards for essential trade are public goods whose provision depends on the powerful. A world in which interdependence can be turned into a weapon is a world in which the costs of conflict are shared

by those who had no say in its making. Reducing those costs is both a matter of justice and a matter of global stability.

References

1. Global Crisis Response Group on Food, Energy and Finance. Global impact of war in Ukraine on food, energy and finance systems. Brief No. 1. New York: United Nations; 2022.
2. Food and Agriculture Organization of the United Nations, International Fund for Agricultural Development, United Nations Children's Fund, World Food Programme, World Health Organization. The state of food security and nutrition in the world 2023. Rome: FAO; 2023.
3. Farrell H, Newman AL. Weaponized interdependence: how global economic networks shape state coercion. Int Secur. 2019;44(1):42-79.
4. Hirschman AO. National power and the structure of foreign trade. Berkeley: University of California Press; 1945.
5. Keohane RO, Nye JS. Power and interdependence: world politics in transition. Boston: Little, Brown; 1977.
6. Drezner DW, Farrell H, Newman AL, editors. The uses and abuses of weaponized interdependence. Washington (DC): Brookings Institution Press; 2021.
7. Ahluwalia PS. Cyber-diplomacy and conflict: how states weaponize the internet in 21st century geopolitics. Siddhanta's Int J Adv Res Arts Humanit. 2025:157-71.
8. Ahluwalia PS. Decoupling and the new Cold War: US-China strategic competition in the global supply chain. Siddhanta's Int J Adv Res Arts Humanit. 2025:55-70.
9. World Bank. Commodity markets outlook: the impact of the war in Ukraine on commodity markets. Washington (DC): World Bank; 2022 Apr.
10. Ahluwalia PS. The rise of techno-authoritarianism: digital surveillance and sovereignty in the Global South. Siddhanta's Int J Adv Res Arts Humanit. 2025:34-54.
11. Ahluwalia PS. Climate as catalyst: how environmental agreements are redefining global power blocs. Siddhanta's Int J Adv Res Arts Humanit. 2025:172-84.
12. Blackwill RD, Harris JM. War by other means: geoeconomics and statecraft. Cambridge (MA): Belknap Press of Harvard University Press; 2016.
13. Baldwin DA. Economic statecraft. Princeton: Princeton University Press; 1985.
14. Gereffi G, Humphrey J, Sturgeon T. The governance of global value chains. Rev Int Polit Econ. 2005;12(1):78-104.
15. Rey H. Dilemma not trilemma: the global financial cycle and monetary policy independence. In: Global dimensions of unconventional monetary policy. Kansas City (MO): Federal Reserve Bank of Kansas City; 2013. p. 285-333.
16. Miranda-Agrippino S, Rey H. US monetary policy and the global financial cycle. Rev Econ Stud. 2020;87(6):2754-76.
17. Gopinath G, Stein JC. Banking, trade, and the making of a dominant currency. Q J Econ. 2021;136(2):783-830.
18. Gopinath G, Boz E, Casas C, Díez FJ, Gourinchas PO, Plagborg-Møller M. Dominant currency paradigm. Am Econ Rev. 2020;110(3):677-719.
19. Farrell H, Newman AL. Weak links in finance and supply chains are easily weaponized. Nature. 2022;605:219-22.
20. Mulder N. The economic weapon: the rise of sanctions as a tool of modern war. New Haven (CT): Yale University Press; 2022.
21. Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ. 2021;372:n71.
22. Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA extension for scoping reviews (PRISMA-ScR): checklist and explanation. Ann Intern Med. 2018;169(7):467-73.
23. Ahluwalia PS. Enhancing systematic transparency through PRISMA-ScR: a scoping review approach for emerging researchers. Siddhanta's Int J Adv Res Arts Humanit. 2025:1-27.
24. Ahluwalia PS. Structured exploration through PRISMA-ScR: a transparent method for mapping research landscapes. Siddhanta's Int J Adv Res Arts Humanit. 2025:137-67.

25. Ahluwalia PS. Ethical issues in social science research. Shodh Patra Int J Multidiscip Stud. 2024:1-8.
26. Ahluwalia PS. How we make plagiarism-free content: theory and practices. Shodh Prakashan J Humanit Soc Sci. 2025:46-53.
27. Ahluwalia PS. Plagiarism: detection techniques and tools. Siddhanta's Int J Adv Res Arts Humanit. 2024:1-11.
28. Laborde D, Martin W, Vos R. Impacts of COVID-19 on global poverty, food security, and diets: insights from global model scenario analysis. Agric Econ. 2021;52(3):375-90.
29. Jagtap S, Trollman H, Trollman F, Garcia-Garcia G, Parra-López C, Duong L, et al. The Russia-Ukraine conflict: its implications for the global food supply chains. Foods. 2022;11(14):2098.
30. United Nations Conference on Trade and Development. The impact on trade and development of the war in Ukraine. Geneva: UNCTAD; 2022.
31. United Nations. Black Sea Grain Initiative: Joint Coordination Centre. New York: United Nations; [cited 2026 Oct 5].
32. Food and Agriculture Organization of the United Nations. FAO food price index. Rome: FAO; [cited 2026 Oct 5].
33. Alexander P, Arneth A, Henry R, Maire J, Rabin S, Rounsevell MDA. High energy and fertilizer prices are more damaging than food export curtailment from Ukraine and Russia for food prices, health and the environment. Nat Food. 2023;4:84-95.
34. International Energy Agency. World energy outlook 2022. Paris: IEA; 2022.
35. International Monetary Fund. World economic outlook: countering the cost-of-living crisis. Washington (DC): IMF; 2022 Oct.
36. World Bank. International debt report 2023. Washington (DC): World Bank; 2023.
37. United Nations Conference on Trade and Development. A world of debt 2023: a growing burden to global prosperity. Geneva: UNCTAD; 2023.
38. Reinhart CM, Rogoff KS. This time is different: eight centuries of financial folly. Princeton: Princeton University Press; 2009.
39. Hamilton JD. Oil and the macroeconomy since World War II. J Polit Econ. 1983;91(2):228-48.
40. Headey D. Rethinking the global food crisis: the role of trade shocks. Food Policy. 2011;36(2):136-46.
41. Martin W, Anderson K. Export restrictions and price insulation during commodity price booms. Am J Agric Econ. 2012;94(2):422-7.
42. Giordani PE, Rocha N, Ruta M. Food prices and the multiplier effect of export policy. J Int Econ. 2016;101:102-22.
43. International Food Policy Research Institute. Food and fertilizer export restrictions tracker. Washington (DC): IFPRI; [cited 2026 Oct 5].
44. Ahluwalia PS. Consumer behavior trends in organic food markets: a comparative study. Shodh Prakashan J Agric Res. 2025;1(1):26-30.
45. Ahluwalia PS. Understanding the multifaceted causes of floods in Asian countries: a comprehensive analysis of climate change, urbanization, and socio-economic factors. Shodh Patra Int J Multidiscip Stud. 2025:614-64.
46. Ahluwalia PS. Comprehensive analysis of flood dynamics and management in Asian countries: a multi-dimensional assessment of economic, social, and environmental impacts. Shodh Patra Int J Multidiscip Stud. 2025:563-602.
47. Ahluwalia PS. Unveiling the hidden crisis: comprehensive analysis of flood disasters and their socioeconomic impacts in Asian countries: a multi-dimensional assessment of risk, vulnerability, and adaptation strategies. Siddhanta's Int J Adv Res Arts Humanit. 2025:127-225.
48. Ahluwalia PS. Impacts of floods on health and healthcare systems in Asian countries: a comprehensive analysis of direct and indirect health consequences, economic burden, and healthcare infrastructure vulnerability. Shodh Prakashan. 2025:72-102.
49. Government of Pakistan. Pakistan floods 2022: post-disaster needs assessment. Islamabad: Government of Pakistan; 2022.
50. Ahluwalia PS. Climate-induced migration and urban fragility: mapping new displacement frontiers in South Asia. Siddhanta's Int J Adv Res Arts Humanit. 2025:71-83.
51. International Energy Agency. Oil 2023: analysis and forecast to 2028. Paris: IEA; 2023.

52. Ahluwalia PS. Bharat-China sambandh: avsar aur chunautiyan [India-China relations: opportunities and challenges]. Siddhanta's Int J Adv Res Arts Humanit. 2023:12-21. Hindi.
53. Reserve Bank of India. International trade settlement in Indian rupee (INR). A.P. (DIR Series) Circular No. 10. Mumbai: Reserve Bank of India; 2022 Jul 11.
54. Ahluwalia PS, Singh D. The gig economy and the erosion of worker identity: a sociological study of precarious labor. Siddhanta's Int J Adv Res Arts Humanit. 2025:38-52.
55. Ahluwalia PS, Kumar A. Platform poverty: the social consequences of algorithmic invisibility on gig workers. Siddhanta's Int J Adv Res Arts Humanit. 2025:240-9.
56. International Monetary Fund. Sri Lanka: request for an Extended Arrangement under the Extended Fund Facility: staff report. IMF Country Report No. 23/116. Washington (DC): IMF; 2023.
57. Singh D, Ahluwalia PS. A socio-legal study on health disparities in Punjab: structural inequities, legislative gaps, and pathways to equitable healthcare. Shodh Prakashan. 2026:1-14.
58. Ahluwalia PS. Doomscrolling and mental fatigue: cognitive overload in the era of crisis media. Siddhanta's Int J Adv Res Arts Humanit. 2025:250-70.
59. Ahluwalia PS, Singh D. The weaponization of nostalgia: national identity, pop culture, and political mythmaking. Siddhanta's Int J Adv Res Arts Humanit. 2025:123-42.
60. Prebisch R. The economic development of Latin America and its principal problems. New York: United Nations Department of Economic Affairs; 1950.
61. Ahluwalia PS, Elliason EK. Decolonizing sociology: indigenous epistemologies and the rewriting of sociological theory. Siddhanta's Int J Adv Res Arts Humanit. 2025:125-36.
62. Ahluwalia PS. Crisis leadership in healthcare: organizational learning from pandemic failures. Siddhanta's Int J Adv Res Arts Humanit. 2025:136-46.
63. Elliason EK, Ahluwalia PS. Prevalence and predictors of trauma-related mental health outcomes among refugees and internally displaced persons in Africa during conflict and crisis: a systematic review and meta-analysis. Interdiscip J Afr Alliance Res Advocacy Innov. 2025;1(2).
64. Ahluwalia PS. Disease burden in India: a comprehensive analysis. Siddhanta's Int J Adv Res Arts Humanit. 2025:179-235.
65. Ahluwalia PS, John S. Disease pattern/trends in India: a comprehensive analysis of epidemiological transitions and public health challenges (2020-2025). Siddhanta's Int J Adv Res Arts Humanit. 2025:20-51.