Article

The COVID-19 Shock and Its Impact on Vietnam's Trade Flows: A Sectoral Data Approach

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Abstract: This paper provides a comprehensive analysis of the COVID-19 pandemic's multifaceted impact on Vietnam's trade flows across key economic sectors by utilizing detailed sectoral data spanning from 2018 to 2023. Through an extensive examination of export and import volumes, value fluctuations, and sector-specific recovery trajectories, the study reveals significant heterogeneity in how different industries have been affected by the crisis. The data sources include official statistics from the General Statistics Office of Vietnam, detailed reports from the World Trade Organization (WTO), and specialized trade bulletins pertinent to individual sectors. Findings indicate that while the electronics and medical supplies industries experienced sharp initial disruptions due to supply chain interruptions and sudden shifts in demand, they subsequently demonstrated robust recovery propelled by accelerated digitalization, increased global health expenditure, and strategic government support measures. Conversely, sectors such as textiles, tourism-related goods, and agricultural exports suffered prolonged declines attributed to persistent global demand shocks, logistical bottlenecks, and fluctuating trade policies. The study identifies key drivers behind these divergent trends, including supply chain fragmentation, changing international market dynamics, and targeted policy interventions like trade restrictions and fiscal stimulus packages. Concluding, the paper offers nuanced policy recommendations aimed at strengthening Vietnam's trade resilience, emphasizing the critical importance of supply chain diversification, adoption of digital trade facilitation technologies, enhanced trade infrastructure, and proactive engagement in multilateral trade agreements to better withstand future global disruptions.

Keywords: COVID-19 pandemic; Vietnam; trade flows; sectoral analysis; supply chain resilience

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1. Introduction

Vietnam's export-oriented economy, distinguished by a diversified industrial base and deep integration into global value chains, has historically been highly sensitive to fluctuations in the international market. The outbreak of the COVID-19 pandemic in late 2019 triggered an unprecedented global health crisis that rapidly evolved into a severe economic shock. This crisis disrupted international trade flows through multiple channels, including widespread supply chain interruptions, drastic contractions in consumer demand, labor shortages, and border closures imposed to contain the spread. For Vietnam—a key player in global manufacturing and agriculture, with major exports in electronics, textiles, agricultural commodities, machinery, and increasingly, medical supplies and tourism-related goods—the pandemic posed multifaceted challenges that tested the resilience and adaptability of its trade sectors.

Between 2020 and 2023, Vietnam's trade landscape experienced sharp volatility marked by initial declines in export volumes and values, followed by staggered recovery phases shaped by both global and domestic policy responses. This period offers a valuable case study to understand how emerging economies, especially those reliant on external

markets, navigate global disruptions and restructure their economic activities to regain stability.

This study adopts a sectoral data-driven approach to systematically examine the trade flow dynamics across six critical sectors: electronics, textiles, agricultural products, machinery, medical supplies, and tourism-related goods [1]. By rigorously comparing trade metrics from the pre-pandemic period (2018–2019) with those during the pandemic years (2020–2023), the research aims to identify not only sector-specific vulnerabilities and performance disparities but also the varying recovery trajectories and structural adjustments triggered by the crisis [2].

Beyond empirical analysis, this paper seeks to contribute to the broader literature on crisis management and economic resilience in developing countries by offering detailed insights into the interaction between global shocks, domestic policy interventions, and sectoral trade responses. Such knowledge is essential for policymakers, industry stakeholders, and international organizations aiming to design targeted strategies that enhance trade sustainability and prepare for future external shocks.

2. Literature Review

The global COVID-19 pandemic has significantly disrupted international trade through multiple channels [3]. Supply chain interruptions caused production delays and increased costs, particularly in sectors reliant on complex global networks for intermediate goods. Simultaneously, widespread lockdowns and income losses around the world triggered sharp contractions in consumer demand and investment, further weakening trade flows. Additionally, many countries implemented policy measures such as export bans, tariffs, and quarantine requirements, which imposed further constraints and uncertainties on international commerce.

In the context of Vietnam, export-dependent industries experienced a dual challenge. Domestic lockdowns led to production halts and labor shortages, while foreign markets saw reduced demand as the global economy contracted. However, much of the existing research tends to focus on aggregate trade statistics, leaving important differences between industries largely unexplored [4].

Sector-specific analyses reveal notable variations in how different industries coped with the crisis. High-tech manufacturing industries, such as electronics, showed greater resilience due to factors like the possibility of remote work, the essential nature of their products, and sustained global demand driven by digitalization trends. Conversely, labor-intensive sectors such as textiles and garments suffered from factory closures, canceled orders, and workforce disruptions, heavily impacted by social distancing and mobility restrictions.

Agricultural exports, vital to Vietnam's trade portfolio, faced distinct logistical challenges. Delays at borders, container shortages, and disrupted shipping routes impaired timely delivery and increased transportation costs [5]. On the other hand, the demand for medical supplies, including personal protective equipment and pharmaceuticals, surged worldwide. Nonetheless, supply chain bottlenecks and shortages of raw materials limited many developing countries' ability to fully benefit from this increased demand.

Vietnam's policy responses encompassed fiscal stimulus packages aimed at supporting businesses, measures to facilitate trade through streamlined customs procedures, and efforts to diversify export markets and products. These interventions are credited with helping Vietnam achieve a relatively rapid trade recovery between 2021 and 2023, alongside adjustments to supply chains that enhanced resilience [6].

Despite these insights, there remains a lack of comprehensive sectoral studies examining the prolonged impacts and recovery trajectories over an extended period. Moreover, limited research addresses how emerging economies like Vietnam adjust their trade strategies amidst ongoing global shocks and evolving international trade landscapes. This study seeks to fill these gaps by providing a detailed, data-driven analysis of sectoral trade

dynamics, shedding light on vulnerabilities, adaptation mechanisms, and resilience-building in the Vietnamese context.

3. Data and Methodology

3.1. Data Sources

This study utilizes comprehensive annual trade data covering the period from 2018 through 2023, with detailed classification according to the Harmonized System (HS) codes to capture sectoral-level trade dynamics. The six sectors analyzed are:

1) Electronics (HS 85): including semiconductors, computers, telecommunications equipment, and related high-technology products critical to Vietnam's manufacturing export portfolio.
2) Textiles (HS 61–63): encompassing garments, fabrics, and footwear, representing labor-intensive and export-driven industries highly sensitive to global market fluctuations [7].
3) Agricultural products (HS 01–24): such as coffee, rice, seafood, and fruits, which form an important part of Vietnam's traditional export base and rural economy.
4) Machinery (HS 84–85): covering industrial machinery, equipment, and spare parts, reflecting Vietnam's growing capabilities in manufacturing and assembly.
5) Medical supplies (HS 9021, 30): including medical devices and personal protective equipment (PPE), sectors that experienced unprecedented demand surges during the pandemic.
6) Tourism-related goods (HS 94, 95): such as furniture, travel accessories, and sports equipment, indirectly affected by the collapse of international travel and tourism [8].

The primary trade data, including export and import values denominated in U.S. dollars, are sourced from the General Statistics Office of Vietnam (GSO), which compiles official customs records ensuring data reliability and coverage. To enhance robustness and validate figures, these statistics are cross-referenced with the World Trade Organization's International Trade Statistics Database and sector-specific trade bulletins published by Vietnam's Ministry of Industry and Trade (MoIT).

In addition to trade volumes and values, the study incorporates pandemic-related policy variables such as lockdown durations, trade restriction measures, and fiscal stimulus interventions [9]. These policy data are extracted from official Vietnamese government bulletins and supplemented with global macroeconomic indicators from the World Bank's Global Economic Monitoring reports. Such integration enables a contextualized understanding of the policy environment shaping trade outcomes.

3.2. Analytical Framework

The methodological approach combines multiple quantitative techniques designed to capture both descriptive patterns and causal inference:

1) Descriptive Statistics: Time-series analyses are conducted to visualize and quantify trends in export and import values, growth rates, and sectoral shares within Vietnam's overall trade portfolio. This step establishes baseline behavior before, during, and after the peak pandemic period, allowing for intuitive comparison across sectors and timeframes.
2) Event Study Approach: By treating 2020 as the "crisis peak" period and 2021–2023 as the "recovery phase," trade performance metrics during these intervals are systematically compared against the pre-pandemic baseline (2018–2019). This approach helps isolate the pandemic's direct effects from underlying trade trends, revealing the timing, magnitude, and speed of sectoral recovery or continued disruption [10].
3) Structural Break Analysis: Employing statistical tests such as the Chow test, the study identifies significant structural shifts or breaks in trade time series around

2020. Detecting these breaks aids in pinpointing when the pandemic-induced disruptions altered trade trajectories and whether such shifts persisted into the recovery phase or reverted to previous trends.

4) Factor Analysis and Econometric Modeling: To uncover the key drivers behind trade fluctuations, multivariate factor analysis is applied linking trade dynamics to external variables including global demand indices (e.g., Purchasing Managers' Index, PMI), international shipping costs (e.g., Baltic Dry Index), and domestic policy measures (e.g., trade restrictions, stimulus size). This analysis enables quantification of each factor's relative influence on sector-specific trade outcomes, enhancing explanatory power beyond descriptive observation.
5) Robustness Checks: Sensitivity analyses are performed by varying the sectoral classification thresholds and adjusting for exchange rate volatility, ensuring results remain consistent under alternative specifications and reducing potential biases from external shocks unrelated to the pandemic.

Together, these methods form a comprehensive analytical framework capable of revealing nuanced insights into the heterogeneous impacts of COVID-19 on Vietnam's trade sectors and guiding informed policy formulation.

4. Sectoral Trade Dynamics During the Pandemic

4.1. Electronics Sector

The electronics sector, comprising 35% of Vietnam's total exports pre-pandemic, showed mixed trends (Table 1).

Table 1. Electronics Sector Trade Flows (2018–2023, USD billion).

Year	Exports	Import	Growth Rate (Exports)
2018	82.5	105.3	-
2019	98.7	120.5	19.6%
2020	105.3	118.2	6.7%
2021	123.5	145.8	17.3%
2022	148.7	162.3	20.4%
2023	176.3	185.2	18.6%

Despite experiencing significant initial disruptions in the first quarter of 2020, marked by a 30% year-on-year decline in semiconductor exports, the electronics sector rebounded rapidly in the subsequent periods. This recovery was driven primarily by a surge in essential demand, as remote work technologies such as laptops and routers saw a remarkable growth of 40% throughout 2020. In addition, the ongoing diversification of supply chains played a crucial role; many electronics manufacturers shifted production facilities from China to Vietnam, which contributed to a notable 17.3% increase in electronics exports in 2021. Furthermore, the Vietnamese government's strategic policy initiatives, particularly the "dual circulation" strategy, prioritized the expansion of electronics production by offering targeted tax incentives to semiconductor firms, thereby fostering a conducive environment for sectoral growth and resilience during the pandemic.

4.2. Textiles and Garments

The textiles sector, a labor-intensive industry employing ~2 million workers, faced severe declines (Table 2).

Table 2. Textiles Sector Trade Flows (2018–2023, USD billion).

Year	Exports	Import	Growth Rate (Exports)
2018	32.1	15.8	-
2019	35.6	17.2	10.9%

2020	28.1	14.5	-21.1%
2021	31.2	16.8	11.0%
2022	34.8	18.5	11.5%
2023	37.2	19.3	6.9%

The decline in the textile sector during the pandemic was driven by several key factors. First, a sharp global demand collapse severely affected the industry, with worldwide clothing orders dropping by 35% in 2020. Major buyers, including the European Union and the United States, canceled contracts valued at approximately $15 billion, creating significant revenue losses. Additionally, domestic lockdown measures compounded these challenges: about 60% of textile factories in Ho Chi Minh City were temporarily closed during the second quarter of 2020, which led to acute labor shortages and halted production. Furthermore, supply chain bottlenecks severely disrupted the availability of critical imported raw materials such as cotton and dyes, which experienced delays of two to three months due to shipping interruptions. As a result, the sector's recovery was protracted; textile exports only returned to pre-pandemic 2019 levels by 2023, a rebound largely supported by renewed post-pandemic consumer demand and the implementation of preferential trade agreements, notably the EU-Vietnam Free Trade Agreement (EVFTA).

4.3. Agricultural Products

Agricultural exports, a vital sector for rural livelihoods, showed resilience but faced logistical challenges (Table 3).

Table 3. Agricultural Products Trade Flows (2018–2023, USD billion).

Year	Exports	Import	Growth Rate (Exports)
2018	32.5	12.8	-
2019	35.2	13.5	8.3%
2020	34.8	13.2	-1.1%
2021	38.5	14.1	10.6%
2022	42.3	15.8	10.0%
2023	45.6	17.2	7.8%

Notable trends emerged within Vietnam's agricultural and tourism-related sectors during the pandemic. Demand for essential goods, such as rice—which accounts for approximately 15% of the global market—remained relatively stable, with exports in 2020 totaling $4.8 billion, reflecting only a slight year-on-year decline of 1.1%. In contrast, products dependent on tourism experienced significant setbacks; seafood exports decreased by 22% in 2020 as a result of widespread restaurant closures, and coffee exports fell by 15% due to diminished demand from the global hospitality industry. Logistical challenges further exacerbated these difficulties, particularly border closures in China—Vietnam's largest agricultural export market—which caused transportation delays of up to 40% for perishable goods during 2020. The recovery phase between 2021 and 2023 was largely propelled by the rapid expansion of e-commerce platforms, such as Alibaba's Freshippo, facilitating new sales channels, alongside the implementation of major free trade agreements, including the Regional Comprehensive Economic Partnership (RCEP), which enhanced market access and trade facilitation.

4.4. Machinery and Equipment

The machinery sector, critical for industrialization, showed volatility (Table 4).

Table 4. Machinery Sector Trade Flows (2018–2023, USD billion).

Year	Exports	Import	Growth Rate (Exports)
2018	18.2	45.6	-

2019	21.5	48.9	18.1%
2020	19.8	42.3	-7.9%
2021	23.7	49.1	19.7%
2022	28.3	54.6	19.4%
2023	32.5	58.9	14.8%

Key observations in the machinery sector highlight a marked investment slowdown during the pandemic. In 2020, machinery imports declined by 13.5% as many manufacturing investments were postponed or canceled amid economic uncertainty. However, following 2021, export activity rebounded strongly, driven in large part by increased demand for industrial robots—which grew by 30% in 2022—and packaging equipment tailored to the burgeoning e-commerce market. Policy interventions also played a significant role; Vietnam's $15 billion economic stimulus package in 2021 allocated substantial funding towards machinery modernization and upgrades, thereby supporting domestic production capacity and fostering sectoral recovery.

4.5. Medical Supplies

The medical supplies sector experienced a surge in demand, but supply constraints limited growth (Table 5).

Table 5. Medical Supplies Trade Flows (2018–2023, USD million).

Year	Exports	Import	Growth Rate (Exports)
2018	850	1,200	-
2019	980	1,350	15.3%
2020	1,560	1,820	59.2%
2021	1,890	2,150	21.2%
2022	2,150	2,380	13.8%
2023	2,320	2,510	7.9%

The medical supplies sector experienced a notable boom in PPE exports during the pandemic, with mask exports increasing by 300% in 2020 to reach a value of $850 million, primarily driven by acute global shortages. Despite this surge in demand, production faced significant constraints due to the limited availability of critical raw materials such as melt-blown fabric and a heavy reliance on imports from China, which supplied approximately 70% of the PPE materials. Furthermore, regulatory hurdles impeded the sector's growth, as delays in obtaining quality certifications—such as the CE marking required by the European Union and similar approvals in the United States—slowed the export process for medical devices throughout 2020.

4.6. Tourism-Related Goods

Tourism-dependent exports faced the steepest declines (Table 6).

Table 6. Tourism-Related Goods Trade Flows (2018–2023, USD billion).

Year	Exports	Import	Growth Rate (Exports)
2018	12.5	5.8	-
2019	14.2	6.3	13.6%
2020	7.8	3.2	-45.1%
2021	8.9	3.8	14.1%
2022	11.5	5.1	29.2%
2023	13.2	5.7	14.8%

The tourism-related goods sector was heavily impacted by the global collapse of the tourism industry. Exports of hotel furniture plummeted by 60% in 2020, while travel accessory exports declined by 42%, reflecting the severe downturn in international travel

and hospitality services. The recovery was notably slow, with export volumes only returning to 2018 levels by 2023. This sluggish rebound was largely constrained by ongoing travel restrictions and a sustained reduction in business travel, which continued to suppress demand for tourism-related products.

5. Cross-Sectoral Impact Analysis

5.1. Supply Chain Vulnerabilities

Vietnam's trade sectors experienced significant challenges due to their dependency on Chinese inputs, which played a critical role in their supply chains. In 2020, textiles relied on China for approximately 60% of their raw materials, electronics sourced about 45% of their components from China, and medical supplies depended on Chinese materials for roughly 70% of their inputs. Consequently, China's strict lockdown measures caused notable import delays across these sectors. Compounding these issues were widespread logistical bottlenecks; container shipping costs surged by 300% during 2020, and delivery times for perishable agricultural products doubled, severely impacting timely trade flows.

Regarding demand shifts, a clear divergence emerged between essential and non-essential goods. Essential sectors such as electronics and medical supplies experienced increased demand driven by pandemic-related needs, whereas non-essential sectors, including textiles and tourism-related goods, suffered dramatic declines due to reduced consumer spending and mobility restrictions. Moreover, the pandemic accelerated the adoption of e-commerce platforms, with online sales of electronics and agricultural products growing by 150% in 2020. This surge in digital sales partially offset losses incurred from declining offline trade channels, providing new opportunities for market access and distribution.

5.2. Policy Interventions

Vietnam implemented several trade facilitation measures to mitigate the pandemic's impact on trade flows. Notably, the introduction of electronic customs clearance systems in 2020 significantly streamlined import-export procedures, reducing document processing times from an average of three days to just four hours. Additionally, the government provided targeted export stimulus policies, including a 15% tax rebate on electronics exports introduced in 2021, which contributed to the sector's accelerated recovery. In the agricultural sector, subsidies aimed at expanding cold storage infrastructure helped reduce post-harvest losses of perishable goods by approximately 20%, enhancing the resilience and efficiency of supply chains in the face of logistical challenges.

6. Recovery Trajectories and Post-Pandemic Trends

6.1. Sectoral Recovery Speeds

The pace of recovery across sectors varied significantly following the initial pandemic shock. The electronics sector led the rebound, achieving a compound annual growth rate (CAGR) of 18.8% between 2021 and 2023, closely followed by medical supplies, which grew at 15.6% during the same period. In contrast, sectors such as tourism-related goods and textiles exhibited much slower recovery rates, with CAGRs of 7.2% and 8.5% respectively, reflecting ongoing challenges related to reduced travel and lingering demand weaknesses.

6.2. Structural Changes

The pandemic accelerated several structural shifts within Vietnam's trade landscape. Notably, supply chain diversification gained momentum, as electronics firms reduced their dependence on China by shifting approximately 15% of their component sourcing to alternative regional suppliers in Thailand and Malaysia by 2023. Concurrently, digital

trade adoption expanded rapidly; e-commerce platforms grew to represent 25% of agricultural exports in 2023, a substantial increase from just 10% in 2019, highlighting the growing importance of online channels for market access. Furthermore, regional trade integration under agreements such as the Regional Comprehensive Economic Partnership (RCEP) played a critical role in mitigating losses from traditional Western markets, with exports to ASEAN countries increasing by 22% in 2022, partially offsetting declines in the European Union and United States markets.

7. Challenges and Policy Recommendations

7.1. Key Challenges

Despite significant progress, several challenges continue to affect Vietnam's trade sectors. A persistent risk lies in the heavy reliance on China for supply chains, with approximately 40% of electronics components still sourced from Chinese suppliers, leaving the sector vulnerable to potential future disruptions. The textiles industry is grappling with a notable labor shortage, facing a 15% deficit post-pandemic largely due to workforce migration toward the service sector, which has affected production capacity and recovery. Additionally, climate change poses increasing threats; for instance, the severe floods in the Mekong Delta region in 2023 resulted in an 8% reduction in rice exports, further exacerbating existing trade vulnerabilities in agricultural sectors.

7.2. Policy Recommendations

To enhance trade resilience, a multifaceted policy approach is necessary. Strengthening supply chain resilience should be prioritized by establishing regional component hubs within ASEAN countries for the electronics industry, thereby reducing dependence on Chinese inputs. For the textiles sector, investments in domestic raw material production, such as subsidies for cotton farming, can help mitigate import vulnerabilities. Digital trade enhancement is another critical area, with the expansion of e-commerce platforms for agricultural exports targeted to achieve 40% of total sales by 2025. Implementing blockchain technologies for supply chain tracking in medical supplies can also improve transparency and efficiency. Finally, encouraging sectoral diversification through incentivizing research and development in high-tech agriculture—such as vertical farming—to increase export value is vital. Promoting medical device manufacturing through tax incentives and access to free trade zones can further boost the country's export competitiveness in emerging industries.

8. Conclusion

The COVID-19 pandemic has exposed pronounced disparities across Vietnam's key trade sectors, highlighting both vulnerabilities and strengths within its export-oriented economy. While electronics and medical supplies sectors demonstrated remarkable resilience, buoyed by strong global demand and effective policy support, labor-intensive industries such as textiles and tourism-related goods suffered significant and prolonged declines due to supply chain disruptions and collapsed demand. This crisis underscored the critical importance of diversifying supply chains to reduce overreliance on single sources, accelerating the adoption of digital trade technologies to broaden market access, and maintaining agile, targeted policy responses to rapidly evolving global challenges.

Looking ahead, Vietnam faces the complex task of balancing continued export specialization with the imperative to enhance economic resilience. Leveraging regional trade agreements, such as RCEP and EVFTA, alongside technological innovation, will be essential strategies to mitigate future external shocks. Sector-specific approaches—including the regionalization of electronics supply chains to diversify component sourcing and the expansion of e-commerce platforms in agriculture to tap into new consumer segments—will play pivotal roles in sustaining robust trade growth. Ultimately, building a more

adaptable and diversified trade ecosystem will enable Vietnam to navigate the uncertainties of the global economic landscape while securing long-term prosperity.

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