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The Reorganization of Global Supply Chains in a Changing World

변화하는 세계 속 글로벌공급망의 재편

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[국문요약]

『광장 국제통상연구원』은 흔들리는 다자무역체제와 자유무역 기조 등 새로운 국제무역질서에 대응하기 위해 『법무법인(유) 광장』의 산하기관으로 설립 되었습니다. 급변하고 있는 국제통상환경을 면밀히 파악해 국내외 전문가들의 지식과 경험을 한데 모아 이를 소통하고 공유하는 열린 토론의 장으로 발전해 나갈 것입니다.

본지에 게재된 글의 모든 저작권은 『광장 국제통상연구원』에 있으며, 무단 복제 및 도용을 금합니다.

The Reorganization of Global Supply Chains in a Changing World

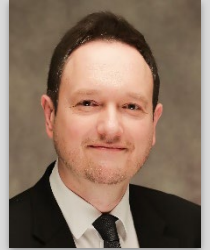
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The COVID-19 pandemic and Russia's war of aggression against Ukraine have put global supply chains (GSCs) under considerable stress. GSCs have become the new buzzword to discuss all problems faced by the global economy, from inflation to shortages of semiconductors to the energy crisis. In the context of heightened geopolitical tensions and widespread uncertainty, policymakers around the world have started to take a closer look at their economic dependencies through GSCs. Several countries have introduced new legislations aimed at promoting diversification of supply, reshoring or 'friend-shoring'. Against this backdrop, this article provides evidence on recent changes in GSCs, discusses prospects for the near future and offers recommendations to Korean Firms to navigate these challenging times.

1. Supply chains remain global despite the COVID-19 pandemic

Since the Financial Crisis in 2008-2009 and its severe trade collapse, there is a debate on risks related to GSCs and economic dependencies created by international production networks. The COVID-19 pandemic and recent geopolitical tensions have revived this debate and triggered new policies based on the assumption that globalization has gone 'too far' and that more resilience in economies could be achieved by relying less on international sourcing.

However, despite the debate on a potential 'deglobalization', data on the international fragmentation of production do not suggest that there is a general trend towards reshoring or shorter supply chains. At the global level, Figure 1 highlights that the import intensity of production (i.e. the value of all trade in intermediate inputs needed to produce one dollar of output, expressed as a share of gross output) remained at a high level in 2021.

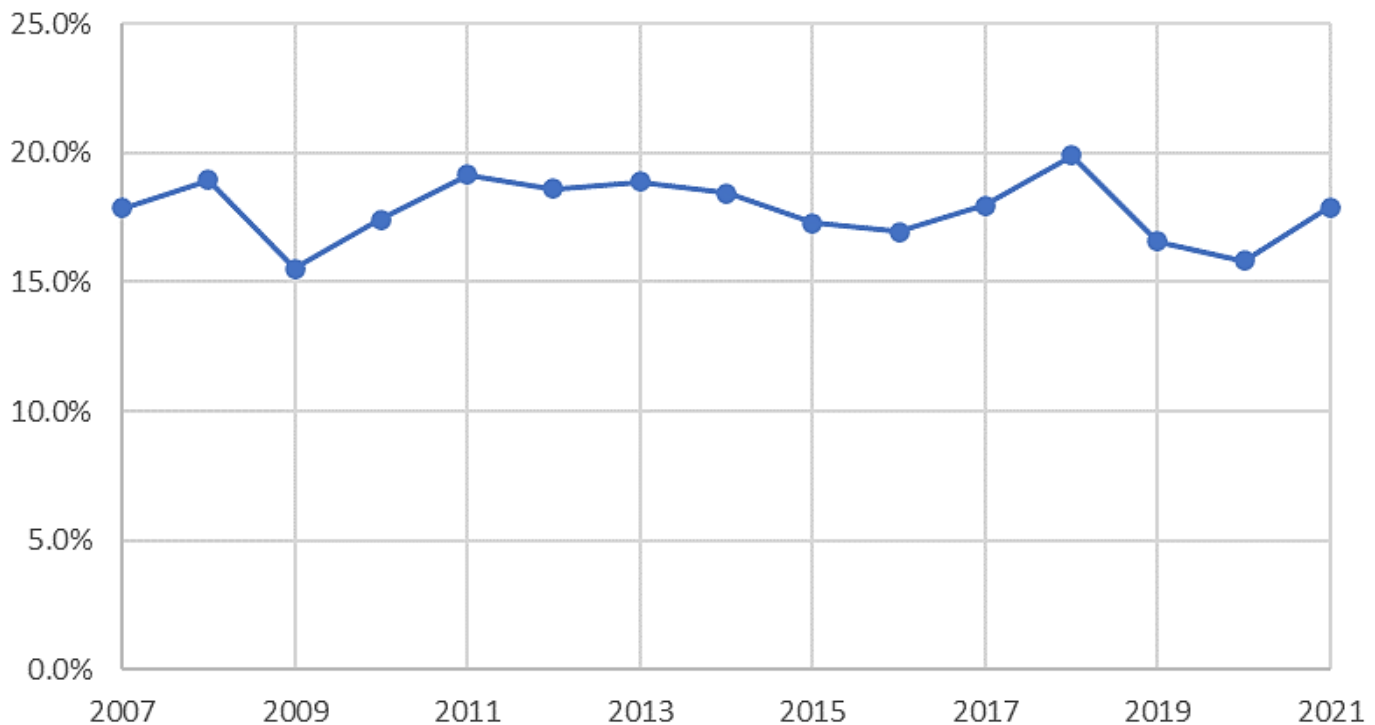


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Figure 1. Global import intensity of production, 2007-2021 (as a share of gross output)



Source: ADB MRIO.

While there were many disruptions in supply chains, the COVID-19 pandemic was a shock that affected output, including domestic output as a consequence of lockdowns and stay-at-home policies. Services activities involving face-to-face contacts or the movement of people were the most impacted and services are generally produced with fewer imported inputs. The demand for some of the goods with the most global supply chains (such as ICT and electronic products needed for teleworking) was on the contrary higher, explaining why the international fragmentation of production remained at a high level.

The expansion of GSCs started in the 1980s and what is true is that the import intensity of production is no longer increasing since the 2008-2009 Financial Crisis. This slowdown in the fragmentation of production is partly driven by the evolution of China, which is the only economy with a significant trend towards more domestic supply chains. However, this evolution should be understood in the context of the upgrading of Chinese value chains and a shift from processing trade (requiring high imports of intermediate inputs) to

exports of branded products developed in China and manufactured with a higher domestic content. The import intensity of production in China is converging towards the level observed for the European Union and is still higher than for the United States or Japan.

2. The twin digital and green transition is the main driver of the reorganization of GSCs

The economic literature suggests several explanations to the slowdown observed in the fragmentation of production after 2011. First, several authors point out that new restrictive trade and investment measures have been introduced after the Financial Crisis and more recently in the context of trade tensions between the U.S. and China. But other structural trends are also mentioned, such as increasing wages in emerging economies, the spread of digital technologies and advanced robotics, the servicification of manufacturing, the ageing of societies or the desire of consumers and companies to move to more sustainable and inclusive production methods.

Recent OECD empirical research indicates that uncertainty and structural shifts in supply chains related to technology and changes in specialization are the main drivers of the reorganization of GSCs.¹ Because governments have liberalized trade through new trade and investment agreements at the same time they have introduced new restrictive measures, the overall stance of trade and investment policies did not contribute to higher costs in GSCs. But the use of trade instruments to deal with security issues or the 'weaponization' of GSCs can be seen as factors that have led to uncertainty.

The structural changes observed in the sourcing patterns of countries are mostly related to the twin digital and green transition. For example, the shift from combustion engines to electric vehicles in the automotive industry implies simpler value chains due to the more limited number of inputs in electric engines, as well as very different sourcing patterns to produce batteries. The shift to services and digital technologies also has an impact on the movement of physical inputs across countries, while green technologies and environmental responsibility provide incentives to produce in countries with higher environmental standards and access to clean energy.

3. GSCs are resilient through agility and flexibility

While there was a debate on the 'vulnerability' of GSCs during COVID-19, the pandemic has actually illustrated the resilience of international production networks in face of an unprecedented shock. Spikes in demand for essential goods, such as face masks, created severe shortages with dramatic consequences. But simulations indicate that these shortages would have been worse in a world of localized production and domestic sourcing.² The efficiency brought by GSCs was key in ramping up the production of face masks, COVID-19 test kits and vaccines.³ Empirical evidence confirms that international supply chains sheltered firms from shortages and contributed to their resilience. Globally engaged firms recovered faster and had a higher capacity to adjust to the COVID-19 shock.⁴

Also going against simple interpretations provided by the popular press during COVID-19, lean management and just-in-time strategies have proven successful in addressing shortages and disruptions. Toyota, the firm that invented lean management, was actually the last automobile manufacturer to cut its production as a result of the global semiconductor shortage. Lean is a management system that expects workers to solve problems immediately on the ground as they occur and makes firms more resilient and agile.⁵

The way firms have adjusted to shocks during recent crises is through agility and flexibility. Agility means that a firm has a management structure that allows to quickly take decisions at a decentralized level to adjust to shocks and changes in the policy environment. Flexibility involves procedures for a firm to be able to change the production process, to manage human resources and to quickly reorganize the supply chain when there is a change in the environment. Other dynamic capabilities of firms that are complementary include the visibility in the supply chain and co-operation with other firms.

There are many examples of how such capabilities were used by firms during COVID-19. Global firms were able to shift production from one location to another based on the propagation of the virus (such as Samsung moving part of its smartphone production from Korea to Viet Nam at the beginning of 2020). Some other firms quickly changed their business model to adapt to restrictions on movement of people (for example by going digital) or their production methods to implement teleworking. Some firms were also able to repurpose production to start producing the essential goods needed during the pandemic.

As illustrated by the unexpected aggression of Russia against Ukraine, it is difficult to predict where the next crisis will be and to organize supply chains in advance to avoid any risk. The supply chain risk management literature recommends the development of agility, flexibility and other dynamic capabilities that can allow firms to mitigate the impact of disruptions and quickly recover after the crisis.

4. Techno-geopolitical uncertainty is the major concern in the near future

Supply chains are global because there are huge economic benefits in trade and an international division of labor that increases productivity and income through specialization and scale economies. There is no alternative to GSCs to create economic efficiency. And efficiency will be needed to address critical challenges such as climate change.

Fragmenting production across countries and trading intermediate inputs across large distances is costly. There is an optimal level of fragmentation of production where there are no further benefits in splitting production internationally because trade and transaction costs become too high. As such, we cannot expect the import intensity of production to continuously increase over time. However, there are still many barriers to trade and investment that suggest that we have not reached this optimal level.

The only reason for supply chains to become shorter or more domestic in the near future are policies that governments would put in place to restrict trade in intermediate inputs or incentivize firms to produce domestically. Since World War II, countries have taken commitments to liberalize trade and to create a rules-based multilateral trading system. Seventy years later, countries have not abandoned such commitments, but some major policy changes are taking place motivated by national security concerns and geopolitical rivalry.

Some scholars suggest that international business has entered a new era characterized by 'techno-geopolitical uncertainty', which can be defined as the 'propensity of disruptions caused by significant policy changes taken by powerful nation states who seek interlocked techno-nationalist and geopolitical gains vis-à-vis rival states'.⁶ The assumption is that there is a zero-sum competition at the world level for technological leadership and the control of GSCs. Trade and investment policies can be used to weaken the competitiveness and technological development of rivals in key industries.

While the twin digital and green transition is a process that firms are fully aware of and for which they can plan, the policy uncertainty of this new era is the main

concern. There are contradictory signals sent by governments who still promote a rules-based and open multilateral trading system while engaging into different policies in sectors deemed as strategic. Operating in such environment and preserving the gains from GSCs will be the main challenge for global firms and the way they will address this challenge will shape the future organization of GSCs.

5. Korean firms will have to adjust to the new policy environment

As governments around the world will introduce new measures rising the costs of international business and creating distortions across countries and industries, global firms will have to constantly re-assess the best way to organize their supply chains and mitigate the impact of government policies. For Korean firms, the challenge will be especially difficult in sectors that are at the center of U.S.-China tensions, such as semiconductors or electric vehicles.

Firms have different strategies to mediate the effect of restrictive trade policies and inward-looking industrial policies.⁷ Switching strategies involve changing the location of production (e.g. from China to Viet Nam), selling products in alternative markets (e.g. in emerging markets in South America and Africa) and sourcing inputs from alternative partners (e.g. from South East Asia). While reshoring or producing directly in markets of countries that will adopt protectionist strategies is an option for the last stage of production (final assembly), supply chains will remain global. Firms will have to explore the potential of the network of existing and new trade and investment agreements or economic partnerships to reduce the exposure of their supply chains to restrictive policies.

Another way of circumventing new trade and investment restrictions is through upgrading. Production upgrading involves selling higher quality products (with higher margins that can absorb higher costs from protectionist policies) or new products for which barriers have not been created yet. In their competition with catching-up Chinese companies, Korean firms have been successful in the past decade

in relying on product upgrading to maintain their competitive edge. Similar strategies will be required to compete with new national champions supported by public interventions in partner economies. The second type of upgrading is functional upgrading where firms change their role and specialization in the supply chain, for example abandoning manufacturing and focusing on design, marketing and branding. While Korea has a strong specialization in manufacturing, shifting to services might be required for the firms the most exposed to trade restrictions on goods.

But more importantly, Korean firms will have to promote the dynamic capabilities previously mentioned, such as agility and flexibility. Moreover, they will have to increasingly monitor geopolitical risks and dedicate resources to corporate diplomacy and lobbying to limit the impact of new regulations and legislations that may affect their GSCs. Co-operation with other firms and partnerships are also part of the toolkit available to firms to circumvent restrictive trade policies and to preserve the benefits of international production. Co-operation with leading technology players from OECD countries could help to defuse some of the techno-geopolitical disruptions. While the position of Korea

looks uncomfortable with high economic stakes both in the U.S. and in China, there are other countries that will not want to choose between the two partners and to engage into a costly decoupling. There are opportunities for alliances and partnerships to mitigate the impact of techno-geopolitical disruptions.

- 1) Jaax, A, S. Miroudot and E. van Lieshout (forthcoming), *Deglobalisation? The reorganisation of GVCs in a changing world*, OECD Trade Policy Paper.
- 2) Arriola, C., S. Guilloux-Nefussi, S.-H. Koh, P. Kowalski, E. Rusticelli, & F. van Tongeren (2021), *Efficiency and risks in global value chains in the context of COVID-19*, OECD Economics Department Working Paper No. 1637.
- 3) OECD (2022). *Global supply chains at work: A tale of three products to fight COVID-19*, OECD Policy Responses to Coronavirus (COVID-19), April 4.
- 4) Constantinescu, C., A. M. Fernandes & S. Reyes (2022), *Globally engaged firms in the Covid-19 crisis*, CESifo Working Paper No. 9711.
- 5) Sheffi, Y. (2021). "What everyone gets wrong about the never-ending COVID-19 supply chain crisis", *Sloan Management Review*, 25 October.
- 6) Luo, Y. & A. Van Assche (forthcoming), "Techno-geopolitical uncertainty and international business: Implications of the United States Chips and Science Act", *Journal of International Business Studies*.
- 7) Gereffi, G., H-C. Lim & J. Lee (2021), "Trade Policies, firm strategies, and adaptive reconfigurations of global value chains", *Journal of International Business Policy*, 4: 506-522.

[국문 요약]

코로나19 대유행 및 러-우 전쟁 등으로 촉발된 인플레이션, 에너지 위기 등 세계경제의 불확실성이 증대된 가운데, 글로벌 공급망(Global Supply Chains, 이하 GSCs)이 다양한 경제 문제 중 핵심으로 부상하게 되었다. 이에 주요국은 기존 GSCs구조의 경제 의존성(economic dependencies)을 면밀히 검토하고 '리쇼어링(reshoring)', '프렌드쇼어링(friend-shoring)' 등 공급망 다변화를 위한 정책 마련에 앞다투고 있다. 이하에서는 최근 GSCs 변화 동향에 대해 설명하고 향후 전망과 이에 대한 한국 기업의 대응 방안에 대해 논의하고자 한다.

1. 코로나19 대유행 상황에도 기존 글로벌 공급망 유지

2008년 금융위기 이후 세계화에 따른 GSCs 및 대외경제 상호의존 심화의 위험성에 대한 논의가 이어져왔다. 그러다가 최근 들어 코로나19 대유행과 지정학적 긴장 고조로 인해 "지나친 세계화의 부작용"에 대한 우려가 나오면서 脫세계화를 기반으로 하는 경제 회복 정책이 나오게 되었다. 그러나 실제 데이터를 살펴보면, 코로나19로 인한 공급망 교란 발생 상황에서도, GSCs 의존도가 상당히 높은 정보통신기술(CT) 기반 제품 및 전자제품 등에 대한 수요가 오히려 증가함에 따라 전체 '생산공정의 국가 간 분업

(international fragmentation of production)'은 높은 수준으로 유지되었다. 또한 금융위기 이후 GSCs 진전이 다소 정체된 측면이 있으나, 이는 중국이 자국 부가가치 사슬을 업그레이드하기 위한 자국 공급망 강화 정책을 펼쳤기 때문이다. 그 결과 중국은 중간재 수입량이 많은 기존의 단순 가공 무역으로부터 탈피하여 중국 브랜드 상품 및 중국산 비중이 높은 상품의 수출 확대를 도모하고 있다.

2. 공급망 재편성의 주요인: 디지털 및 그린 전환

최근 OECD의 연구에 따르면, 기술 관련 공급망 불확실성과 구조적 변화, 그리고 생산 특화 (specialization) 전략의 변화 등이 GSCs 재편의 주요인으로 나타났다. 각국의 무역 자유화 협정 체결과 무역 제한 조치 발동이 동시에 진행됨에 따라 전반적인 GSCs 비용이 크게 증가하지는 않았지만, 국가들이 안보 이슈를 다루기 위한 수단으로서 무역조치를 활용하거나 GSCs를 '무기화' 하게 됨에 따라 불확실성이 야기되었다. 또한, 국가들의 대외구매(sourcing) 방식에서 발견되는 대부분의 구조적 변화는 디지털 및 그린 전환과 관련되어 있는 것으로 나타났다. 이는 디지털 기술 발전으로 인해 공급망이 더욱 단순해지고, 각 국의 그린 정책은 기업들이 높은 환경 기준 및 청정에너지에 대한 접근성이 용이한 곳에서 생산하는 데 인센티브를 제공하기 때문이다.

3. 민첩성 및 유연성을 통한 복원력 있는 공급망 구축

코로나19 대유행 기간 동안 의약품 및 의료기기 등의 부족을 경험하며 GSCs의 취약성에 대한 논란이 있었지만, 글로벌 기업이 GSCs를 통해 코로나19 충격으로부터 빠르게 회복함에 따라 글로벌 생산 네트워크의 복원력(resilience)을 반증하는 계기가 되기도 하였다. 최근 기업들은 '민첩성(agility)'와 '유연성(flexibility)'을 통해 외부 위협에 대응하고 있다. '민첩성'은 기업이 정책 환경의 충격과 변화에 적응하기 위해 분권화된 시스템 내에서 신속하게 의사결정을 내릴 수 있는 관리 구조 확보를 의미하고, '유연성'은 기업이 생산 공정 변경, 인적 자원 관리, 신속한 공급망 재편 등을 할 수 있는 절차와 관련되어 있다. 이 밖에 상호보완적인 기업의 동적 역량 (dynamic capabilities) 으로 공급망의 '가시성(visibility)'이나 다른 기업과의 협력 등을 들 수 있다.

4. 향후 기술 및 지정학적 불확실성에 대한 우려

제2차 세계 대전 이후, 무역 자유화 및 규칙 기반의 다자무역 체제 구축 필요성에 대한 공감대가 형성되었고, 이후 수십 년간 글로벌 생산 분업화를 통해 비용 절감과 효율성 극대화가 추구되어 왔다. 그러나 일각에서는 이제 기술 및 지정학적 불확실성(techno-geopolitical uncertainty)'의 시대로 접어들어 따라, 강대국들이 경쟁국을 상대로 기술-국가주의적, 지정학적 이득을 추구하기 위해 택하는 주요 정책들로 인하여 글로벌 생산 분업화에 혼란이 야기될 것으로 전망하고 있다. 즉, 주요국의 무역 및 투자 정책이 타국의 핵심 산업의 경쟁력과 기술 개발을 약화시키는 데 사용될 수 있다는 것이다. 디지털 및 그린 전환의 큰 흐름 속에서 국가 간 정책 노선의 불확실성이 우려되는 가운데 특히 GSCs의 이점을 지키는 것이야말로 글로벌 기업들의 주요 과제가 될 것이며, 이들의 대응 과정을 통해서 미래 GSCs가 재편될 것이다.

5. 한국기업: 새로운 정책 환경에 대응해야

향후 주요국의 정부는 글로벌 비즈니스 비용을 높이고 국가와 산업 전반을 왜곡시키는 새로운 조치를 도입할 것으로 보인다. 따라서 글로벌 비즈니스 환경 또한 어려워질 것으로 예상된다. 특히 반도체나 전기차 등 미-중 갈등의 중심에 있는 분야에서 한국 기업들의 입장은 더욱 힘들어질 것으로 보인다. 최종 조립 등 생산의 최종 단계에 있어서 리쇼어링을 할 것인지 아니면 보호무역주의 전략을 취한 국가에서 직접 생산할 것인지 등은 기업의 선택사항이지만, 공급망은 글로벌한 상태를 유지할 것으로 보인다. 기업들은 무역 제한 정책과 내부 지향적 (inward-looking) 산업 정책에 따른 영향을 최소화하기 위해 각기 다른 전략을 펼칠 수 있을 것이다. 다음은 기업들이 생각해볼 수 있는 전략들이다.

- **생산 전환 전략:** △생산지 변경(예: 중국에서 베트남으로 이전), △대체시장에서 제품 판매(예: 남미 및 아프리카 등 신흥 시장 진출), △원자재 대체 공급처 확보(예: 동남아시아) 등
- **판매 제품 다변화:** 생산 고도화를 통해 양질의 제품 판매, 또는 아직 무역 장벽의 대상이 아닌 새로운 제품 판매 도모
- **기능적 업그레이드 전략:** 제품 자체뿐 아니라 디자인, 마케팅 및 브랜드 등의 역할과 전문성 업그레이드

- **서비스산업 특화 전략:** 상품에 대한 무역 제한 조치가 증가함에 따라 기존의 특화된 제조업 분야에서 벗어나 서비스 산업으로 전환
- **동적 역량 강화:** 지정학적 위험에 대한 긴밀한 모니터링을 통해 민첩성과 유연성과 같은 동적 역량 강화
- **외교 및 로비 활동 활용:** 글로벌 공급망에 영향을 미칠 수 있는 새로운 규제 및 법률의 영향을 제한하기 위해 기업 외교와 로비에 많은 자원을 투입
- **선진 기술 협력:** 선진 기술기업과의 협력을 통해 기술 지정학적 혼란 완화 도모
- **글로벌 네트워크 적극 활용:** 기존 혹은 새로운 국가 간 무역 및 투자 협정, 그리고 경제 파트너십 등을 활용하여 기술지정학적 혼란을 완화시키고, 다른 기업과의 협력 및 파트너십을 통해 무역제한조치 우회

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- 법무법인(유) 광장 [홈페이지](#)에서 모든 이슈브리프 발간물들을 보실 수 있습니다.
 - 이 뉴스레터는 일반적인 정보 제공만을 목적으로 발행된 것으로서, 법무법인(유) 광장의 공식적인 견해나 법률의견이 아님을 알려드립니다. 『광장 국제통상연구원』에서 발송하는 뉴스레터를 원하지 않으시면 [수신거부](#)를 클릭해 주십시오.
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