



Harvard Model Congress

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TECHNOLOGY TRANSFER AND GLOBAL INNOVATION

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INTRODUCTION

Amidst the COVID-19 pandemic in October of 2021, the Group of 20 (G20) established a task force to work towards a 70% global vaccination rate and coordinated efforts to prepare for a future pandemic. To reach this target, countries with access to mRNA vaccine manufacturing would have to voluntarily share their technology with other member states to increase manufacturing capability throughout the world (Strupczewski and Shalal, 2021). The World Health Organization had already created an mRNA vaccine technology transfer hub in South Africa to build manufacturing capacity in low to middle-income countries, and the results had been promising. The challenge for G20 members was how restrictive the sharing would be.



*Researchers at the WHO
vaccine tech transfer hub in
Cape Town, South Africa
Bloomberg*

Some countries have argued for a broad non-restrictive approach to technology-sharing that involves waiving **intellectual property** (IP) protections for the vaccine temporarily to allow for the rapid development of new manufacturing plants in developing countries. Others want a more restrictive approach that prioritizes the protection of IP along with setting strict requirements for countries that can qualify for the program (Strupczewski and Shalal, 2021). The disagreements between members highlights the difficulty in balancing the humanitarian needs of those receiving the technology and concerns about potential abuse and loss of IP protection for those sharing.

The G20 represents the world's largest economies and the primary drivers of global innovation. Technology-sharing between G20 members will help push the frontier of research and development while transferring that knowledge to developing countries that can assist in global development. The G20 has committed to meeting the United Nations Sustainable Development Goals (SDGs) by 2030 and technology transfer is a critical component of that initiative (G20, 2022).

*G20 members
account for nearly
80% of the global
economy.*

As the humanitarian demand for new technology grows, the G20 needs to establish a clear framework in which member states can share technology with each other. In doing so, the quality of life and speed of innovation can improve globally.

EXPLANATION OF THE ISSUE

Historical Development

Technology-sharing and its concerns have been around for centuries. Throughout much of history, the sharing of tech has largely been involuntary. Countries would engage in espionage to steal knowledge about weapons and metalwork to gain an upper hand over their enemies.

At the height of the Cold War, countries such as the United States and the Soviet Union actively worked to safeguard technological secrets related to defense capabilities. The United States passed legislation that restricted scientists from specific European countries from partnering with U.S. firms and universities to conduct research (Thomas-Noone, 2021). It was not until the 1970s and Richard Nixon's policy of **détente** that the United States and the U.S.S.R engaged in formal transfers of tech between the U.S. and Soviet Bloc countries (Thomas-Noone, 2021). Despite the animosity between the two nations, the mutual exchange of knowledge and technology relating to environmental protection, energy production, and arms control helped advance industrial production on both sides. Moreover, tech-sharing yielded breakthroughs in innovation that improved the quality of life for both countries.

At the global level, there are a wide range of agreements between various member countries to facilitate transfers of technical knowledge and physical hardware. Most of these agreements tend to be between specific countries or small groups of countries. The World Trade Organization (WTO), which consists of 159 member countries, has regulations that prohibit the mandatory or illicit transfer of technology (WTO, 2023). Thus, any agreements relating to tech must be accepted by each country voluntarily and drawn up under a legal framework.

The United Nation's SDGs were established in 2015 and agreed upon by all members of the UN, including all 20 members of the G20. The UN has repeatedly called upon G20 members to assist the global effort of meeting the SDGs by 2030 (UNDP, 2023). This will require a comprehensive technology-sharing framework that allows for developing nations to quickly gain access to technology while encouraging maximum cooperation between G20 members in pushing the frontier of innovation.

Scope of the Problem

The challenge of creating a technology-sharing framework is shaped by three primary factors: geopolitical disputes, intellectual property theft, and

***Détente – a policy
of reducing tension
between the U.S.
and China pursued
by Richard Nixon.***

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the cost of tech transfers. Each of these factors contributes to the hesitation of many countries with technology to agree to share it with their peers.

Geopolitical Disputes

The G20 represents the collection of the 20 largest economies in the world. Thus, it comprises a diverse set of members, many of whom have competing geopolitical interests. The difficulty is to build a framework that can bridge or accommodate such a divide.

The two largest economies in the G20 are the US and China, and they often find themselves at odds regarding issues of trade, Taiwan, and diplomatic engagements, to name just a few (Council on Foreign Relations, 2023). Historically, the U.S. and China have been on friendly terms regarding cooperation in R&D. Until the mid-2010s, the research partnership between both countries was very strong, with technology-sharing occurring in a wide range of fields from agricultural to environmental and beyond. The breakthroughs because of the nations' partnership have helped increase commercial trade, reduce hunger, and decrease pollution well beyond their respective borders (Thomas-Noone, 2021).

Unfortunately, there has been a marked increase in tension between the two countries that has undermined cooperation in science and technology. The geopolitical dispute has already led to an end in the sharing of microchip technology and calls for an end to a 44-year-old Science and Technology Agreement between the two countries (Ip, 2023). Both countries are unable to trust the other to not abuse their access to shared technology, even if there is a pressing humanitarian need. Such animosity is not unique to just China and the United States.

Across the board, geopolitical disagreements stand in the way of cooperation. The European Union and Russia are currently at odds over Russia's invasion of Ukraine. The EU, along with the United States, has imposed strict sanctions on Russia, specifically targeting the technology sector. The EU and the US have halted exports of semiconductors to Russia, and the country is experiencing brain drain as research partnerships end and scientists flee (EU Research Service, 2023). Thus, the challenge of designing a tech-sharing framework is flexibility. A strong resolution should be able to accommodate existing geopolitical disputes between members while maximizing the level of cooperation between countries.

Intellectual Property Theft

IP theft is a big concern for the private sector. It primarily impacts large tech firms in the West, but it also carries a negative cost for the tech sector as a whole. IP theft is detrimental to a company's profits as its competitors can reap the benefits without having to pay for R&D. A report by the US Senate noted that a company loses around \$100 million to IP theft on average (Chairman's Staff, 2012). In aggregate, IP theft costs the US economy about \$225 to \$600 billion a year (Huang and Smith, 2019). If left unchecked, innovation will be stifled as companies are disincentivized to



*President Biden
announcing
restrictions on the
exportation of
microchips to China
The Guardian*



The US unveiled a series of indictments against Huawei and its CFO for IP theft among other crimes.

Reuters

take risks with R&D only for the knowledge to be stolen by competitors. Chinese companies have long been accused of engaging in IP theft, leading to a high level of distrust among major tech firms in the West. Many countries within the G20 have robust legal protections for IP that can make tech-sharing difficult.

Currently, the time it takes for a successful tech transfer is around 10 months to a year (O’Sullivan et. al 2021). In cases where the amount of technical expertise needed and R&D cost of the tech is high, such as in the case of the COVID-19 vaccine, the time needed for a successful transfer is around 27-29 months (O’Sullivan et. al 2021). Thus, there is a tradeoff to having strong IP protections. While safeguards against IP theft are effective at incentivizing innovation, valuable time is lost in working towards the challenge of compliance. In many humanitarian situations, such as a pandemic, lost time can mean a higher number of deaths.

Delegates should seek to craft a policy framework that can balance the need for profits of private companies that produce the research with the need for a streamlined sharing procedure that can address humanitarian issues more quickly and effectively.

Cost of Tech Transfers

The cost of tech transfers for developing countries tends to be very high. Economists have identified two major problems that lead to this high cost. These are **asymmetric information** and **market power** (Hoekman et. Al, 2005). Asymmetric information means that there is a gap in knowledge between the entity transferring the tech and those on the receiving end. Developing countries are operating from a position of limited knowledge regarding the latest technology. Thus, they are unable to effectively judge whether a tech transfer is the most efficient and cheapest option. This mismatch of information can lead to situations where the tech transfer does not match the needs and capabilities for the implementation of the receiver. This leads to funds being wasted with little progress (Hoekman et. Al, 2005).

Market power, in this instance, relates to the control that private companies have over a specific product after development. For example, vaccine companies are protected by IP laws and patents, allowing them to set the price in the market since no other companies are allowed to access their technology (Hoekman et. Al, 2005). Thus, some firms have a near monopoly on emerging tech. This results in a more expensive price for tech transfers to developing countries.

G20 Action

The G20 has emphasized the importance of tech transfer in meeting the UN’s SDG goals. The 2022 G20 Leader’s Declaration, a unanimously approved agenda for the year, mentioned the importance of tech transfer and encouraged members to participate in knowledge-sharing and tech transfer across a wide range of fields (G20, 2022). The focus is primarily climate

change technology that can assist developing countries increase green energy production and cope with rising sea levels. The framework outlined by the G20 contains language that encourages member states to engage in tech transfer but leaves the details relatively vague.

Delegates should attempt to address the issue head-on and create a framework that is clear and actionable by all member states.

Other Policy Action

The Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) was adopted by the WTO in 1995 as the primary legal document in terms of governing international IP transfers (WTO, 2023). While disputes are settled by the WTO, the G20 can set guidelines for its own members regarding settling future disputes without needing to engage in lengthy litigation at the WTO.

Additionally, the UN General Assembly has adopted resolution 68/220 on Science and Technology for Development. The resolution calls upon member states to share technology relating to meeting the sustainable development goals set forth by the body.

*The Leader's
Declaration is the
approved resolutions
agreed upon by the
G20 for the year.*

IDEOLOGICAL VIEWPOINTS

Cooperationist

Cooperationists tend to lean towards an easing of restrictions in tech-sharing. Usually, countries who stand to gain the most from tech-sharing are cooperationists. Developing countries such as India, Brazil, and South Africa have strong emerging tech sectors that yearn for more advanced tech from the West and elsewhere. For example, India has recently signed agreements with the United States that would bolster semiconductor production in India and increase research partnerships relating to AI (Jacob 2023). On the other hand, Brazil has signed a flurry of memorandums with China that included tech transfers relating to agriculture and green energy (Osborn 2023). Cooperationists tend to view existing barriers to tech transfers as too restrictive. Additionally, they have been pushing for some technology relating to vaccines to be exempt from traditional IP protections.

Restrictionist

Restrictionists are not entirely against tech-sharing but do have a more skeptical outlook on the mutual benefits of tech-sharing. Some countries are fearful that their tech-sharing partnerships will one day come back to haunt them as they may empower geopolitical rivals. Entities such as the United States, the EU, and China have imposed restrictions on the types of technologies and research partnerships that can take place. For example, there exist severe restrictions on the export of microchips between the US and China. Additionally, large tech companies within the respective

countries have, on occasion, refused tech transfer requests for competitive reasons.

The concerns are understandable. Countries such as China have been accused of abusing the tech transfer process. Foreign businesses were forced to share sensitive technical knowledge to gain access to the Chinese market. It was later revealed that domestic Chinese firms took the information and gained a competitive edge against foreign rivals (Branstetter, 2018). Thus, countries and companies are weary of giving up valuable knowledge to rival states. The impact of this theft on innovation is significant since companies may lose the competitive edge that they paid a lot of money to develop. Restrictionists believe in strong regulations related to research partnerships and defensive strategies, such as export controls to reduce the flow of tech out of their borders.

China is accused of forcing companies to hand over sensitive technical data to gain access to the Chinese market.

AREAS OF DEBATE

The areas of debate and potential solutions discussed should be considered as a starting point for research since they are by no means exhaustive. Delegates should work to craft solutions that fit the needs of the country they represent.

Establish a Research Fund

The primary challenge for developing countries seeking to expand their technology is the lack of funding for R&D. Oftentimes, countries would create tax incentives for the private sector to bear the burden of developing emerging tech with the promise of future benefits resulting from innovation. While this does alleviate the pressure on governments, the research outputted by the private sector tend to be closely guarded behind IP protections. Large multinational companies have been looking to outsource the bulk of engineering and R&D to developing countries. A recent 2023 report noted that nearly 60% of companies intend to outsource or increase outsourcing of R&D over the next three years (Suter et. al 2023). This dramatic shift has coincided with a rise in developing countries implementing tax incentives, primarily taxpayer funded, for multinational firms to invest in R&D (Crespi et. al, 2016). This leads to a situation where the research costs are carried by the government with questionable returns to investment.

Increasing research aid will help address this misalignment of incentives. It is a relatively quick band-aid solution for countries who do not want to share their technology and would prefer that developing countries work towards building their own tech sector. Additionally, funds are easy to monitor with proper protocols and, if implemented correctly, can be seen as a long-term solution. There are also drawbacks to a funds-oriented approach. The process of R&D takes a very long time, and the issues faced by the developing world are on a time scale of months to years,

not decades. Additionally, increasing research aid should not come at the expense of a tech-sharing agreement since it is not a complete solution to the problem by itself.

Political Perspectives on this Solution

The solution is broadly popular with both groups. Cooperationists see this as a much-needed policy that would complement a more open tech-sharing policy. Developing countries could use the fund to aid the rollout of the tech transfer and build upon the new knowledge. However, they argue that if a fund is the sole policy adopted by the G20 it will be inadequate to address the concerns of the cooperationist bloc.

Restrictionists also see this as a potential solution to their fears of giving away their IP. It is a solution that empowers smaller countries to take charge of their future while allowing the developed world to hold on to their tech. The biggest concerns for restrictionists would be the type of research permitted and who will be the beneficiary of such a fund. There are still real concerns about empowering geopolitical rivals that needs to be addressed.



Kigali, Rwanda is an emerging tech hub in a rapidly developing country.

TechNext

Improve Tech-Sharing Matchmaking]

Tech-sharing is a costly endeavor for developing countries, even with monetary support from developed nations. Putting aside concerns of geopolitics and IP theft, both cooperationists and restrictionists believe that certain tech should be shared, a practice hindered by costs arising from mismatch of tech transfer. In areas of emerging tech where the tech is changing rapidly, developing countries are disadvantaged by the lack of access to information. A mismatch between community need and the tech transfer can lead to costly implementation and inefficiency.

There have been past efforts to address this issue. For instance, the U.S.-Asia Environmental Partnership (US-AEP), funded by the United States Agency for International Development (USAID), serve as the primary coordinator to connect American firms with Asian clients (UNCTAD, 2004). US-AEP works with Asian partners (such as the Singaporean Public Utilities Board) to find companies that can offer the most suitable technology at the most competitive price points (UNCTAD, 2004). In doing so, developing countries can bypass the knowledge gap and obtain new technical knowledge for cheaper.

The challenge in implementing this policy is figuring out how to facilitate matchmaking that is not swayed by politics or private interests. Delegates should seek to address concerns about who will be overseeing the matchmaking process and how the integrity of the process can be ensured. Developing countries are operating with a gap in knowledge of emerging technologies, so an independent, non-corrupt third party is critical to ensuring that these countries receive the best possible tech for the most competitive prices.

Emerging tech has the potential to document war crimes, improve humanitarian aid distribution and predict areas of conflict.

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Political Perspectives on this Solution

The divide between cooperationists and restrictionists is less clear on this issue. For the most part, they agree. The real point of disagreement stems from the conflicting interests of each member of the G20. Large, high-tech economies may want to encourage the adoption of their technology, partly for profit and partly for increased influence. For instance, the United States may want to push its own technology to counter Chinese influence among the developing world. Moreover, firms looking to increase their profits may want the matchmaking entity to choose their tech instead of a rival. Delegates pursuing this solution should work to balance all these competing interests to ensure that developing countries are not being taken advantage of.



Moderna refused to share its mRNA technology with China
BBC

Temporarily Waiving IP Protections

There have been growing calls by countries such as India and South Africa relating to the waiving of IP protection in times of crisis (Lawson, 2022). Both nations argued that IP protections of COVID-19 vaccine were hindering the global vaccination effort. While issues of IP and patent enforcement tend to fall under the jurisdiction of the WTO, the G20, with its position as the global economic leaders, can establish a framework in which IP protections should be voluntarily waived for a set amount of time.

The greatest benefit of this plan is its ability to save countless lives in future crises. Emerging technologies such as blockchain have the potential to give refugees identification and securely distribute aid to crisis zones while generative AI may assist on-the-ground responders to be more effective in communicating with victims (OECD, 2022). These are all promising humanitarian uses of emerging technologies that are being hindered by IP protections.

There are also drawbacks to this policy. Private firms that have invested in a large amount of R&D will refuse to give up the profits from their tech. Creating an incentive large enough to counter the risks these companies face will be a challenge for proponents of this solution. Moreover, once the technical knowledge is shared, it is very difficult to restrict its dissemination. Thus, a temporary waiving of IP rights must promise strong protection to ensure that only the appropriate individuals are privy to the details.

Political Perspectives on this Solution

Cooperationists will strongly support this policy as it will help save many lives in times of crisis. Additionally, they can benefit from the technology with very little research put in. The challenge for cooperationists is to come up with proper incentives that can persuade restrictionists to create such a framework. They should think about how private companies should be compensated for their R&D investment and what protections should be put in place to safeguard IP secrets once the waiver expires.

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Restrictionists will be skeptical of this solution as they are concerned about IP theft. However, they could be adequately persuaded if the humanitarian need is great enough and there are enough IP protections in place.

International Tech-Sharing Alliance

International alliances in research are not new concepts. The Human Genome Sequencing Project or Rice Genome Sequencing Project were consortiums of numerous countries all working towards a common goal. These consortiums have revolutionized the fields of medicine and agriculture, respectively (UNCTAD, 2004). Research alliances coordinate knowledge between countries to make sure that each contribution complement each other, helping to maximize impact. Additionally, they help reduce both risk and costs of R&D of each individual state by spreading the burden among many different countries. Some argue that the same logic can be applied to tech transfers.

The G20 can create different alliances that specialize in a specific technology. For instance, the G20 can mobilize an alliance for vaccine research, green technology, or agricultural practices to name just a few. Countries would be able to contribute tech that they are comfortable with sharing and the risk of tech transfers would be spread among many countries. The primary challenge to implementation is to get member states to agree and coordinate on resolving these challenges.

Political Perspectives on this Solution

Cooperationists would be concerned about whether developed countries are willing to part with their tech. This strategy only works if everyone is willing to buy in. Hence, cooperationists fear that countries may be incentivized to “free load,” letting other countries bear the burden while they refrain from contributing. This would result in only outdated or inferior tech being shared, hindering development. Restrictionists may view this strategy as too open and one that does not do enough to protect them from the risks.

Developing countries have been supportive of participating in a tech-sharing alliance but remain concerned about having to pick sides. For instance, the Shanghai Cooperation Organization (SCO), led by China, actively engages in tech-sharing relating to environmental tech. The SCO comprises a block of Eurasian countries ranging from Russia and Kazakhstan to Pakistan and India (Sawhney, 2023). On the other hand, a U.S.-led initiative through the Quad and G7 is working to share 5G technology and establish a new global standard for communication infrastructure (Sawhney, 2023). Each block consists of numerous developing countries benefiting from the tech transfer but having to pick a

side. Thus, a tech-sharing alliance by the G20 must address the concerns of both sides and prevent an increase in geopolitical tension.

Increase Public-Private Partnerships

Public-private partnerships can be either an alternative or complement to establishing research funding. These partnerships rely on government agencies in developed countries offering financial support and incentives to private companies to take up projects that can be implemented in developing countries. The agency would connect businesses with local contacts abroad and provide guidance on how the firm can transfer technical expertise to resolve problems. Unlike direct funding for R&D abroad, funds are distributed in a manner that allows for maximum monitoring. If a firm fails to deliver, the funding can be revoked. Additionally, the connections available to the business increase the likelihood of a successful tech transfer (UNCTAD, 2004). This method would decrease the likelihood of a tech transfer mismatch and could potentially reduce costs for the developing country. The money and expertise provided can reduce the risk for businesses, increasing the likelihood of tech transfers. A good example to look at for a model of public-private partnership would be the GIZ in Germany, a developmental agency that fosters these partnerships to support international development.

There are a few drawbacks to this solution. The first is increased government bureaucracy. The agency must be well-funded, well-managed, and non-corrupt to maximize its impact. Companies need to trust that they will be well compensated for their effort and that their sensitive information do not get leaked during the process. Delegates who choose this solution should be mindful of the inefficiency of government and the potential for delays and mismanagement of funds.

Political Perspectives on this Solution

Cooperationists may be hesitant to fully support this solution since partnerships have to go through a country's government. This may lead to geopolitical disputes to interfere with the tech transfer process. Moreover, the most cutting-edge technology will be too expensive to be subsidized by the government, meaning they will remain inaccessible to the developing world.

Restrictionists would prefer this option over increasing research funding since there is an additional layer of oversight. They would push for the agency to take firm steps in protecting the interests of the private company and the government.

BUDGETARY CONSIDERATIONS

The G20 operates as a forum for discussion among member countries, thus it does not have a formal fund nor annual budget. With that said, G20

Public-Private Partnerships – a partnership between the government and a private firm with the goal of incentivizing tech-sharing.

countries have historically agreed to put aside money for specific causes. For example, the G20 established a pandemic fund to assist the establishment of new pandemic-preparedness measures among developing countries. Member states voluntarily pledge donations, and a governing board is established to oversee the fund.

Delegates are reminded that any agreement between member states relating to monetary contributions must be clearly quantified in terms of either percentage of GDP or numeric dollar amounts. It is important to be realistic about the amount of money that your country is willing to contribute. Additionally, be specific with who will source the funding and where the money will be allocated. A successful resolution will be specific and realistic with funding and clear where the money is going.

Germany allocates 3.3 billion Euros to fund GIZ annually.

CONCLUSION

In the race to meet the global challenges of the era, cooperation in the development and deployment of emerging technology to solve these problems is a necessity. Technology-sharing is a must if developing countries can respond quickly to issues ranging from climate change to preparing for the next famine or pandemic. Increase in geopolitical tensions has fostered feelings of mistrust and division, undermining the unity needed to solve problems. Additionally, well-intentioned IP protections designed to increase innovation have slowed the tech transfer process and stifled development. The information gap between the developing world and technologically advanced nations has resulted in costly tech transfer mismatch that overburdens smaller countries. All these factors have led to a slowdown in global cooperation.

The core questions posed by these issues revolve around balancing humanitarian needs with private and national interests. How can companies transfer life-saving technology while still being compensated for their R&D? Are there technologies that should be exempted from IP protections? How should states protect their national interests and avoid potentially helping their adversaries?

As you ponder these questions and craft your policy solutions, remember that there is no silver bullet that will resolve all these issues. Every policy has drawbacks. A successful resolution will match the views of your country, be financially feasible, and be clear in its implementation and enforcement.

GUIDE TO FURTHER RESEARCH

This briefing should serve as the beginning point for your research. Look into think tank reports, UN resolutions, G20 declarations, and mainstream news agencies for credible sources of information. Remember that the list of policies in the briefing is not exhaustive and should only be

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an outline for your personal research and eventual resolution. As you analyze policy proposals, ask yourself about how you will enforce compliance, how it will be implemented, and what is the cost of your plan.

The Council on Foreign Relations, U.N. Reports and Resolutions, Carnegie Endowment for Peace, Foreign Affairs Magazine, and Foreign Policy are all great sources for new updates and analyses of international developments. Utilize news sources from your assigned country to gain a better understanding of the stances you will be taking. Do consider potential areas of bias as you conduct your research.

GLOSSARY

Asymmetric Information – when there is a gap in product knowledge between the creator and end-user.

Detente – A policy of reducing tensions between the U.S. and China pursued by Richard Nixon.

Intellectual Property – work or invention that is protected by patents, trademarks, copyright, and other laws.

Market Power – the ability to control prices on the market.

Public-Private Partnerships – a partnership between the government and a private firm with the goal of incentivizing tech-sharing.

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