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Review Article

Who Will Govern the World: New Structure of the International System of Covid-19 Vaccine Producing Countries

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ABSTRACT

In early 2020, the international community was faced with Covid-19. At the global level, the COVAX Facility was established to ensure all countries in the world have equal access to Covid-19 vaccines. However, many vaccine-producing countries have undertaken bilateral ways to distribute vaccines directly. The existence of the Covid-19 vaccine is still determined by vaccine manufacturing companies. This article aims to examine the international structure after the outbreak of the Covid-19 pandemic based on the postulate that Covid-19 vaccine-producing countries will become world hegemons in a non-polar world structure. The concepts used are health diplomacy and hegemony. The evolving operational components used to determine world hegemon are vaccine types, consumer countries, and vaccine production capacity. The method used is pseudo-qualitative. The article concludes that (i) world hegemony in terms of vaccine types is China, Russia, the United States, and India; (ii) the world hegemons in terms of the number of consumer countries are the United States, the United Kingdom and China, and (iii) the world hegemons in terms of vaccine production capacity are China, the United States, Germany, and the United Kingdom. Finally, the world hegemons that meet these all criteria are China and the United States.

Keywords: *Health Diplomacy, Hegemony, International Structure, Covid 19 Vaccine*

ABSTRAK

Pada awal 2020, komunitas internasional dihadapkan dengan Covid-19. Di tingkat global, Fasilitas COVAX didirikan untuk memastikan semua negara di dunia memiliki akses yang sama terhadap vaksin Covid-19. Namun, banyak negara penghasil vaksin telah melakukan cara bilateral untuk mendistribusikan vaksin secara langsung. Keberadaan vaksin Covid-19 masih ditentukan oleh perusahaan pembuat vaksin. Artikel ini bertujuan untuk mengkaji struktur internasional pasca merebaknya pandemi Covid-19 berdasarkan postulat bahwa negara-negara penghasil vaksin Covid-19 akan menjadi hegemoni dunia dalam struktur dunia non-polar. Konsep yang digunakan adalah diplomasi kesehatan dan hegemoni. Komponen operasional yang berkembang yang digunakan untuk menentukan hegemon dunia adalah jenis vaksin, negara konsumen, dan kapasitas produksi vaksin. Metode yang digunakan adalah pseudo-kualitatif. Artikel tersebut menyimpulkan bahwa (i) hegemoni dunia dalam hal jenis vaksin adalah Cina, Rusia, Amerika Serikat, dan India; (ii) hegemoni dunia dalam hal jumlah negara konsumen adalah Amerika Serikat, Inggris dan Cina, dan (iii) hegemoni dunia dalam hal kapasitas produksi vaksin adalah Cina, Amerika Serikat, Jerman, dan Inggris. Akhirnya, hegemoni dunia yang memenuhi semua kriteria ini adalah Cina dan Amerika Serikat.

Kata kunci: *Diplomasi Kesehatan, Hegemoni, Struktur Internasional, Vaksin Covid 19*

INTRODUCTION

At the end of 2019, the World Health Organization (WHO) announced the existence of Corona Virus Disease (COVID-19). On January 10, 2020, it was discovered that Covid-19 was introducedinto ribonucleid acid (RNA) viruses, namely new types of corona viruses, betacorona, viruses and also coronaviruses that cause severe acute respiratory syndrome (*SARS) and middle east respiratory syndrome (MERS CoV*) (Handayani dkk, 2020) . The naming of "COVID-19" was unveiled by the WHO on February 11, while "SARS-CoV-2" on the same date, the naming was announced by the *International Committee on Taxonomy of Viruses* (ICTV). On January 12, "2019-nCoV" was designated as the temporary name for the virus before it was changed to SARS-CoV-2.

SARS-CoV-2 was first known to infect humans in 2019. The *novel* outbreak of the SARS-CoV-2 coronavirus began in December 2019, and reportedly first appeared in Wuhan, China (Huang et al., 2020 (Young, Thone and Jik, 2021) As of January 23, 2020, confirmed cases have been reported successively in 32 provinces, cities, and special administrative regions in China, including Hong Kong, Macau, and Taiwan (Wang et. al., 2020)

The spread of COVID-19 cases is no longer limited to China. From January 13 to 19, the first case reports began to appear in Thailand, Japan, and Korea (Wang et. al., 2020)

In March 2020, Italy reported 86,498 cases and the Americas 85,228 cases, as well as other countries reaching 199 countries reporting Covid-19 cases) (Handayani et. al., 2020). Until March 2020, the World Health Organization (WHO) declared the Coronavirus (COVID-19) as a global pandemic (Susilo & dkk, 2020).

As of October 14, 2021, Worldometers released that there were 239,705,607 cases of Covid-19 worldwide with a total of 4,885,363 deaths and a total of 35,001,050 recovered cases. When viewed from the spread of regions in the world: in Europe there were 60,846,135 total cases with a total depth of 1,25,786 cases and a total recovered of 55,646,601 cases; in North America there were 54,629,862 total cases with a total of 1,110,623 deaths and a total recovered of 42,891,242 cases cases; in Asia there were 77,433,486 total cases with total deaths of 1,143,039 cases and total recovered of 74,322,703 cases ; in South America there were 38,056,744 total cases with total deaths of 1,161,676 cases and totally recovered of 36,181,243 cases case; in Africa, there were 8,475,228 total cases with a total of 214,951 deaths and a total of 7,791,292 recoveries; and in Oceania, there were 263,431 total cases with a total of 1,478 deaths and a total of 96,234 recovered (Worldometer, 2021).

As of September 10, 2021, John Hopkins University released the 10 countries in the world with the highest number of Covid-19 cases. In the United States, there are 40,408,995 total cases with a total of 651,398 deaths. India has 33,174,954 total cases with 442,009 deaths. In Brazil, there were 20,958,899 total cases with a total of 585,174 deaths. In the UK there were 7,132,072 total cases with a total of 133,841 deaths. In Russia, there were 6,982,628 total cases with a total of 186,999 deaths. In France, there were 6,877,825 total cases with a total of 115,363 deaths. In Turkey, there are 6,590,384 total cases with a total of 59,170 deaths. In Ira, there are 5,237,799 total cases with a total of 112,935 deaths. In Argentina, there were 5,218,993 total cases with a total of 113,099 deaths. In Colomb,ia there are 4,925,000 total cases with a total of 125,480 deaths (University, 2021).

Seeing the power of Covid-19 which is so fast spreading and deadly, the international community has made various efforts, one of which is vaccination. Globally, there is the Global Alliance for Vaccines and Immunization (GAVI) as an international institution that handles vaccines and immunizations. Within its operations, GAVI develops various partnerships to support its programs, such as partnerships with The Bill & Melinda Gates Foundation, UNICEF, WHO, World Bank, *Civil Society Organization* (CSO), pharmaceutical industry in industrialized and developing countries, Technical Education and Health Institutes, and also governments of countries. In the development of the COVID-19 vaccine, GAVI has a role ranging from vaccine clinical trials to distribution (www.gavi.org). As of November 14, 2021, there are 194 vaccines that are in preclinical trials, 32 vaccines that are in phase 1 trials, 46 vaccines that are in phase 2 trials, 39 vaccines that are in phase 3 trials, and 21 vaccines that have been approved

for use, and 10 vaccines that are under surveillance for phase 4 trials (www.gavi.org). The role of GAVI in the distribution of vaccines that are being used in the world can be seen in the figure 1 below:

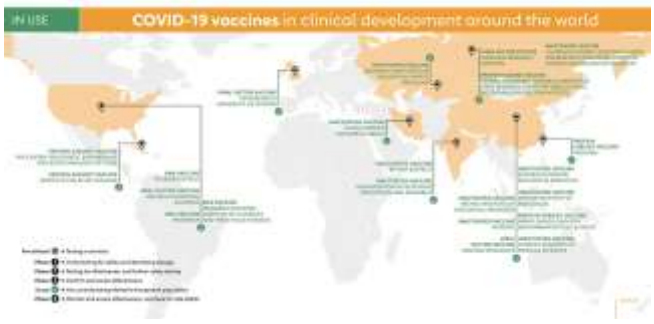

Figure 1. In-Use Vaccines in GAVI Coordination (Source: https://www.gavi.org/vaccineswork/covid-19-vaccine-race)

The issue of equitable access to the Covid-19 vaccine arises. To that end, on April 24, 2020, WHO initiated a global collaboration to accelerate the development, production, and equitable access to COVID-19 vaccines called the Access to COVID-19 *Tools* (ACT) *Accelerator*. The initiative launched the COVAX Facility Program as a result of coordination between Gavi, the Coalition for Epidemic Preparedness Innovations (CEPI), and WHO. Countries participating in the COVAX Facility will benefit: COVAX Facility: (i) will supply enough vaccine doses to immunize 20% of the population in participating countries, (ii) A diversified and actively managed vaccine portfolio, (iii) Vaccines will be delivered as soon as they become available, (iv) End the acute phase of the pandemic, and (v) Rebuilding perparticipating country's economy. As of November 2, 2021, the Covax Facility has delivered more than 435 million vaccines to 144 participating countries (https://www.gavi.org/covax-facility). The COVAX Facility was conceived to ensure that all countries in the world have equal access to Covid 19 vaccines by the end of 2021 (UNICEF, 2021).

Although at the global level, there are GAVI and also the Covax Facility that manages the development and distribution of COVID-19 vaccines, basically the availability of COVID-19 vaccines is very dependent on the producing countries, especially vaccine companies. Of the 195 countries in the world, there are only 8 countries producing COVID-19 vaccines, namely: China, the United States, the European Union, India, the United Kingdom, Russia, Switzerland, and North Korea. Because the Covid 19 vaccine is a real need for every country in the world, in the author's view, Covid 19 is the *soft power* of vaccine-producing countries to carry out health diplomacy, bilaterally and globally. This real need will lead to dependence from countries in the world on vaccine manufacturers. Dependence could eventually lead to hegemonic relations between vaccine-producing countries to their consumers.

Although at the global level, there is GAVI as well as the Covax Facility that manages the development and distribution of COVID-19 vaccines (Berkley, 2020), the availability of COVID-19 vaccines is highly dependent on the producing countries, especially vaccine companies (Callaway, 2020). Of the 195 countries in the world, there are only 8 countries that produce COVID-19 vaccines, namely: China, the United States, the European Union, India, the United Kingdom, Russia, Switzerland, and North Korea.

This article aims to examine the behavior of vaccine-producing countries in an effort at global hegemony that determines the international structure. The proposition offered in this article is that since Covid 19 vaccines are needed by every country in the world, COVID-19 vaccine manufacturers will become the new hegemon in the international structure. It is hoped that this research can strengthen information in the form of data reports according to the latest facts regarding the Covid-19 vaccines

METHOD

The method used in writing this article is qualitative by collecting secondary data. This article utilizes diverse data sources to strengthen the quality and integrity of the information. Peer-reviewed scientific studies are referenced to support medical and scientific claims related to COVID-19 and its vaccine efficacy. The latest data on the development of COVID-19 and COVID-19 vaccines, coming from health organizations such as the Centers for Disease Control and Prevention (CDC) and the World Health Organization (WHO), are used to present the latest statistics and trends. In addition, news from trusted media helps in understanding public response and policy developments. Regulatory documents from the government provide insight into the official policies and guidelines in place. in the form of reports, factual data (the latest data related to the development of COVID-19 and the COVID-19 vaccine), news, and also state regulatory documents. Based on the theoretical framework, the data to be collected are grouped into the following themes:

1. Health Diplomacy of COVID-19 Vaccine Producing Countries.
2. Hegemony with the operational components of COVID-19 vaccine production in the form of vaccine

prices, production capacity, and the number of consuming countries.

Data validity is done by comparing the content of the data source. Data analysis is carried out using coding and Excel tools.

In analyzing the data, the author used the Python programming language. The choice of Python is based on its flexibility in manipulating and analyzing data. In addition, the author also used specialized libraries such as Pandas and NumPy to facilitate data processing.

Before conducting the analysis, the author performed several data processing steps. First, data collected from different sources was consolidated into a single dataset. Then, the author performed data cleaning by removing incomplete or invalid entries. After that, the author performed variable transformations, such as changing the date format or merging relevant columns. Finally, the author calculates certain statistics, such as mean, median, or percentage, using functions available in the Pandas library.

In addition to using the Python programming language, the author also used Excel as a tool for data analysis. Data that has been processed in Python is exported into Excel format to perform data visualization using graphs or pivot tables. The author used Excel formulas to calculate additional statistics or conduct further analysis.

To ensure the validity and reliability of the data analysis, the author took several steps. First, I verified the data by comparing the analysis results with the original data sources. In addition, I also conducted sensitivity testing by changing some of the analysis parameters to see if the results remained consistent. The entire data analysis process was also well documented to enable replication and verification by other parties.

RESULTS AND DISCUSSION

Health Diplomacy of COVID-19 Vaccine-Producing Countries

In a non-polar international structure, every country has an equal opportunity in its existence depending on the efforts it makes. In a landscape defined by a non-polar international structure, where countries have equal opportunities based on their efforts, the COVID-19 pandemic has emerged as a unique test of capabilities and resources. Against this backdrop, vaccination has become both a tool for public health and a product driving competitive market dynamics. The pandemic has forced countries to accelerate their vaccine development process, from the usual 5-10 years to just one year. This rush to produce effective and safe vaccines is a microcosm of broader global challenges and opportunities, highlighting not only the science but also the complex commercialization and geopolitical implications involved. As countries strive to protect their populations, they also find themselves in the global marketplace, grappling with the challenges of knowledge gaps, production capacity, and market strategies. This competitive environment is compounded by vaccine scarcity, making it imperative for countries to rapidly optimize production and distribution strategies.

Vaccination, which is believed to be able to reduce Covid-19, makes countries compete to produce it. However, in addition to saving the lives of the human race, another excess of the existence of the Covid-19 vaccine is the commercialization of vaccines. The international community is a real global market for COVID-19 vaccine consumers. The challenge of commercialization is knowledge about COVID-19 vaccines and competitors. In terms of knowledge, vaccine development usually takes 5-10 years. But Covid-19 forced countries to find vaccines in just one year and produce them in bulk at once. The safety and effectiveness of vaccines to prevent COVID-19 and affordable selling prices are challenges. Few countries are used to producing vaccines. This makes the Covid-19 vaccine rare with the number of potential consumers being people worldwide. But even though it is rare, there are several Covid-19 vaccine manufacturers so competition is inevitable. The essence of this competition lies in the capabilities of vaccine production companies in terms of knowledge, production capabilities, and marketing to ensure that the vaccines produced can be sold.

Having explored the challenges and intricacies of vaccine development and commercialization in the global market, it is important to shift our focus to another important aspect in this complex landscape: diplomacy. The urgency related to COVID-19 vaccines does not end with their manufacture; there are all sorts of political and administrative hurdles that different countries must skillfully navigate. From ensuring the vaccine meets global standards and legal requirements to managing its distribution both nationally and internationally. The role of diplomacy is crucial here as countries not only need to secure vaccines for their citizens but also participate in larger global health initiatives. This next section will therefore discuss the nuances of health diplomacy, taking a closer look at the legal framework guidelines that guide vaccine

distribution and the strategic relationships that countries must form to succeed in this global endeavor.

The country has a considerable role in the Covid-19 vaccine industry so it needs to develop a good diplomacy strategy. *First*, in terms of the legality of the vaccine. A new COVID-19 vaccine can be distributed and used (*in use*) for consumers after passing the GAVI clinical trial consisting of 3 stages. Clinical trials in addition to vaccine quality issues, certainly go through a series of administrative procedures that require rigor and patience in negotiation. After passing clinical trials, *second*, sales became another challenge. Vaccine-producing countries have made bilateral sales. However, the international community is aware of the conditions of anarchy that may arise if there is no good management. The COVAX Facility was established to address this. Vaccine-producing countries inevitably have to participate in this global program. Therefore, it can be seen that the health diplomacy of COVID-19 vaccine-producing countries at the global level is to develop strong relations with international institutions formed to coordinate COVID-19 vaccine governance, namely the Covax Facility, based on vaccine quality.

In addition to diplomacy at the global level, vaccine-producing countries also need to conduct diplomacy directly with consumer countries. This diplomacy is carried out with the aim of *first*, the government of the consuming country allowing vaccines to enter and be consumed (Gavi, 2021). Every country does not necessarily take vaccines just like that. Clinical trial procedures to bring up certificates of recognition and also official regulations that allow vaccines need to be undertaken. Why? After all, vaccines are health products that on the one hand can save but on the other hand, can be destructive as well. Prospective consumer countries will be very careful in choosing and allowing what type of vaccine will be used by their people. *Second*, competing countries also offer the same vaccine to potential consumer countries. COVID-19 vaccine-producing countries cannot force consumer countries to buy vaccines, so a good approach in diplomacy is absolutely necessary because the decision to buy or not to buy from prospective consumer countries certainly does not only involve the government. At the national level, there are many actors who play a role in determining vaccine permits, namely health institutions, and academics, even in Muslim countries, the Covid-19 vaccine must meet halal tests.

In Covid-19 vaccine health diplomacy, the vaccine itself is the *soft power* of the producing country. Hegemony can take place when the vaccines produced are consumed by many countries even though there are competitors. Competitors are not too essential because there are few of them. The hegemony of the COVID-19 vaccine manufacturers will eventually change the pattern of dependence of all countries in the world which leads to the construction of a new international structure. Vaccine-producing countries will become polar with the constructed being scattered.

International Structural Hegemony in the Shadow of COVID-19 Vaccine Manufacturers

In the manufacturing process, vaccines are divided into five phases (Gavi, 2021). The first is called the *pre-clinical* phase, which is when vaccine trials are carried out on animals. The *first phase* of the trial, then, aims to test the safety of the vaccine, determine dosage, and identify potential side effects in a small number of people. The *second phase* trial further explored safety and began investigating efficacy in larger groups. The *third phase* of the trial, which has so far been conducted by 34 vaccine manufacturers, involves thousands or tens of thousands of people, to confirm and assess the effectiveness of the vaccine and test whether there are rare side effects that only appear in certain groups.

The final phase, *the fourth phase* trial, was conducted after national regulatory approval and involved further monitoring of a large population over a longer period of time as a form of *pharmacovigilance*. However, not all vaccines that have been approved at the domestic level have gone through phase four trials. Governments in many countries have their own procedures and timelines for granting emergency use authorization, relying on different types of evidence at different phases of clinical trials. Some national policies, including in Russia and China, began approving vaccines for public use (limited or widespread) even before phase three trials were completed (Gavi, 2021). The development of Covid-19 vaccine production in the world is as follows:

Table 1. The Development of Covid-19 Vaccine
Source (Gavi, 2021)

Phase	Number of Vaccines
Pre-Clinical	194
Phase One	40
Phase Two	35
Phase Three	34
In Use	21
Phase Four	8

It can be seen in Table 1 that vaccines that are currently being used or have been circulating in the general public number 21 brands, but those that have reached phase four are only eight. This is due to differences in policies in each country related to the use of vaccines as previously explained. The following is data related to vaccines that have been approved by several countries for use by the general public:

Table 2. Covid-19 Vaccine in Use

No	Vaccine Identity		
1	Vaccine Name	:	Pfizer/ BioNTech
	Company	:	Pfizer and BioNTech
	Country of Origin	:	Germany and America
	Production Capacity	:	3 billion doses targeted in 2021 (Arthur, 2021)
	Price	:	European Dabout $23.15 per dose (Kansteiner, 2021)
	Distribution	:	(100 Countries) Americas, Singapore, United Kingdom, Bahrain, Kanada, Mexico, Switzerland, Indonesia, Malaysia, Argentina, Albania, Australia, Austria, Azerbaijan, Bangladesh, Belgium, Bermuda, Bosnia, Herzegovia, Botswana, Brazil, Brunei Darussalam, Bulgaria, Cabo Verde, Chile, Colombia, Costa Rica, Croatia, Cyprus, Czechia, Denmark, Dominican Republic, Ecuador, El Salvador, Estonia, Faroe Island, Finland, France, Goergia, Germany, Greece, Greenland, Hong Kong, Hungary, Iceland, Iraq, Ireland, Israel, Italy, Japan, Jordan, Kenya, Kuwait, Latvia, Lebanon, Libya, Liechtenstein, Lithuania, Luxembourg, Maldives, Malta, Monaco, Mongolia, Netherlands, New Zealand, Nigeria, North Macedonia, Norway, Oman, Pakistan, Panama, Paraguay, Peru, Philippines, Poland, Portugal, Puerto Rico, Qatar, South Korea, Moldova, Romania, Rwanda, Saint Vincent and the Grenadines, Saudi Arabia, Serbia, Singapore, Slovakia, Slovenia, South Africa, Spain, Sri Lanka, Sweden, Thailand, Trinidad and Tobago, Tunisia, Turkey, Ukraine, United Arab Emirates, Uruguay, Vatican, Vietnam, West Bank (McGill COVID19 Vaccine Tracker Team, 2021)
	Type of Agreement	:	• A €100 million debt financing agreement with the European Investment Bank to boost vaccine production in Europe. • In February 2021, a phase four trial was launched as part of a national cohort study in collaboration with the Danish Ministry of Interior and Health.
2	Vaccine Name	:	AstraZeneca
	Company	:	AstraZeneca and University of Oxford
	Country of Origin	:	United Kingdom
	Production Capacity	:	Target to reach 3 billion doses by the end of 2021 (AstraZeneca, 2021)
	Price	:	Around $2.15 in Europe; $3-4 in the UK and America; and $5.25 in South Africa (Terry, 2021)
	Distribution	:	(122 Countries) Albania, Angola, Argentina, Armenia, Australia, Austria, Azerbaijan, Belgium, Belize, Benin, Bermuda, Bosnia and Herzegovina, Botswana, Brazil, Brunei Darussalam, Bulgaria, Burkina Faso, Cambodia, Canada, Central African Republic, Chile, Colombia, Costa Rica, Croatia, Cyprus, Czechia, Côte d'Ivoire , Democratic Republic of the Congo, Dominican Republic, Ecuador, Egypt, El Salvador, Estonia, Eswatini, Fiji, Finland, France, Gambia, Georgia, Germany, Ghana, Greece, Grenada, Guatemala, Guinea-Bissau, Guyana, Haiti, Hungary, Iceland, India, Indonesia, Iran (Islamic Republic of), Iraq, Ireland, Italy, Jamaica, Japan, Jordan,

			Kenya, Kosovo, Kuwait, Latvia, Lesotho, Liberia, Libya, Liechtenstein, Lithuania, Luxembourg, Malawi, Malaysia, Mali, Malta, Mauritius, Mexico, Mongolia, Morocco, Nauru, Netherlands, New Zealand, Niger, Nigeria, North Macedonia, Oman, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Portugal, Republic of Korea, Republic of Moldova, Romania, Rwanda, Sao Tome and Principe, Saudi Arabia, Senegal, Serbia, Sierra Leo ne, Slovakia, Slovenia, South Sudan, Spain, Sri Lanka, Sudan, Sweden, Taiwan, Tajikistan, Thailand, Timor-Leste, Togo, Tunisia, Uganda, United Arab Emirates, United Kingdom of Great Britain and Northern Ireland, Uruguay, Uzbekistan. Vanuatu, Vietnam, Yemen, Zambia (McGill COVID19 Vaccine Tracker Team, 2021)
	Type of Agreement	:	No data
3	Vaccine Name	:	Sinovac/CoronaVac
	Country of Origin	:	China
	Company	:	Sinovac Biotech Ltd.
	Production Capacity	:	5 billion doses in a year (Khaliq, 2021)
	Price	:	About $29.75 per dose (Terry, 2021)
	Distribution	:	(40 Countries) China, Indonesia, Turkey, Chile, Hong Kong, Brazil, Cambodia, Malaysia, Albania, Argentina, Armenia, Azerbaijan, Bangladesh, Benin, Colombia, Dominican Republic, Ecuador, Egypt, El Salvador, Georgia, Kazakhstan, Laos, Nepal, Mexico, Oman, Pakistan, Panama, Paraguay, Philippines, South Africa, Sri Lanka, Tajikistan, Thailand, Timor-Leste, Togo, Tunisia, Ukraine, Tanzania, Uruguay, Zimbabwe (McGill COVID19 Vaccine Tracker Team, 2021)
	Type of Agreement	:	No data
4	Vaccine Name	:	CanSino Biologics
	Country of Origin	:	China
	Company	:	CanSino Biologics Inc.
	Production Capacity:	:	500 million in a year (Reuters, 2021)
	Price:	:	Unknown
	Distribution	:	(9 Countries) China, Mexico, Pakistan, Malaysia, Argentina, Chile, Ecuador, Hungary, Indonesia (McGill COVID19 Vaccine Tracker Team, 2021)
	Type of Agreement	:	No data
5	Vaccine Name	:	Sputnik V/Gamaleya
	Country of Origin	:	Russia and India
	Company	:	Serum Institute of India and R-Pharm's
	Production Capacity	:	1.152 billion per year (Statista Research Departement, 2021)
	Price	:	About $10 per dose
	Distribution	:	(71 Countries) Albania, Algeria, Angola, Antigua and Barbuda, Argentina, Armenia, Azerbaijan, Bahrain, Bangladesh, Belarus, Bolivia (Plurinational State of), Brazil, Cameroon, Chile, Djibouti, Ecuador, Egypt, Gabon, Ghana, Guatemala, Guinea, Guyana, Honduras, Hungary, India, Indonesia, Iran (Islamic Republic of), Iraq, Jordan, Kazakhstan, Kenya, Kyrgyzstan, Lao People's Democratic Republic, Lebanon, Libya, Maldives, Mali, Mauritius, Mexico, Mongolia, Montenegro, Morocco, Myanmar, Namibia, Nepal, Nicaragua, Nigeria, North Macedonia, Oman, Pakistan, Panama, Paraguay, Philippines, Republic of Moldova, Republic of the Congo, Russian Federation, Saint Vincent and the Grenadines, San Marino, Serbia, Seychelles, Sri Lanka, Syrian Arab Republic,

			Tunisia, Turkey, Turkmenistan, United Arab Emirates, Uzbekistan, Venezuela (Bolivarian Republic of), Viet Nam, West Bank, Zimbabwe (McGill COVID19 Vaccine Tracker Team, 2021)
	Type of Agreement	:	No data
6	Vaccine Name	:	Moderna
	Country of Origin	:	United States
	Company	:	Moderna (funded by the Institute of Allergy and Infectious Diseases, which is part of the United National Institutes of Health)
	Production Capacity	:	800 million to 1 billion doses by 2021, target of 3 billion doses by 2022 (Steenhuysen & O'donnell, 2021)
	Price	:	In Europe around $25.50 per dose (Kansteiner, 2021)
	Distribution	:	(72 Countries) Australia, Austria, Bangladesh, Belgium, Bhutan, Botswana, Brunei Darussalam, Bulgaria, Canada, Colombia, Croatia, Cyprus, Czechia, Denmark, Estonia, Faroe Islands, Fiji, Finland, France, Germany, Greece, Greenland, Guatemala, Haiti, Honduras, Hungary, Iceland, India, Indonesia, Ireland, Israel, Italy, Kenya, Kuwait, Latvia, Libya, Liechtenstein, Lithuania, Luxembourg, Malaysia, Maldives, Malta, Mexico, Mongolia, Netherlands, Nigeria, Norway, Pakistan, Philippines, Poland, Portugal, Puerto Rico, Qatar, Republic of Korea, Romania, Rwanda, Saint Vincent and the Grenadines, Saudi Arabia, Seychelles, Singapore, Slovakia, Slovenia, Spain, Sweden, Switzerland, Taiwan, Thailand, United Arab Emirates, United Kingdom of Great Britain and Northern Ireland, United States of America, Vietnam, West Bank McGill(McGill COVID19 Vaccine Tracker Team, 2021)
	Type of Agreement	:	No data
7	Vaccine Name	:	Johnson & Johnson
	Country of Origin	:	United States
	Company	:	Janssen
	Production Capacity	:	Approximately 1 billion doses by 2021 (Johnson & Johnson, 2021)
	Price	:	About $10 per dose (Terry, 2021)
	Distribution	:	(66 Countries) Australia, Austria, Bahrain, Bangladesh, Belgium, Brazil, Bulgaria, Canada, Chile, Colombia, Croatia, Cyprus, Czechia, Denmark, Egypt, Estonia, Faroe Islands, Finland, France, Germany, Ghana, Greece, Hungary, Iceland, India, Indonesia, Iran (Islamic Republic of), Ireland, Italy, Kuwait, Latvia, Libya, Liechtenstein, Lithuania, Luxembourg, Malaysia, Maldives, Malta, Mexico, Netherlands, New Zealand, Nigeria, Norway, Papua New Guinea, Philippines, Poland, Portugal, Puerto Rico, Republic of Korea, Romania, Saint Vincent and the Grenadines, Slovakia, Slovenia, South Africa, Spain, Sweden, Switzerland, Thailand, Tunisia, Ukraine, United Kingdom of Great Britain and Northern Ireland, United Republic of Tanzania, United States of America, Vietnam, Zambia, Zimbabwe (McGill COVID19 Vaccine Tracker Team, 2021)
	Type of Agreement	:	No data
8	Vaccine Name:	:	Anhui Zhifei Longcom/ZF2001
	Country of Origin	:	China
	Company	:	Anhui Zhifei Longcom and Institute of Microbiology at the Chinese Academy of Sciences
	Production Capacity	:	Targeted at 1 billion doses by 2021 (Pinghui & Chik, 2021)

	Price		No data
	Distribution	:	(2 Countries) China,
		:	Uzbekistan (McGill COVID19 Vaccine Tracker Team, 2021)
	Type of Agreement	:	No data
9	Vaccine Name	:	Covaxin
	Country of Origin	:	India
	Company	:	Bharat Biotech
	Production Capacity	:	Targeted at 360 million doses by 2021 (Pilla, 2021)
	Price	:	About $2 per dose in India (Terry, 2021)
	Distribution	:	(9 Countries) Guyana, India, Iran, Mauritius, Mexico, Nepal, Paraguay, Philippines, Zimbabwe (McGill COVID19 Vaccine Tracker Team, 2021)
	Type of Agreement	:	No data
10	Vaccine Name	:	Abdala (CIGB-66)
	Country of Origin	:	Cuba
	Company	:	Center for Genetic Engineering and Biotechnology (Cuba)
	Production Capacity	:	The target of 2 million doses per month, is estimated to start production in August or September 2021 (Al Jazeera, 2021)
	Price		
	Distribution	:	No Data
		:	(3 Countries) Cuba, Venezuela, Vietnam (McGill COVID19 Vaccine Tracker Team, 2021)
	Type of Agreement	:	No data
11	Vaccine Name	:	CoviVac
	Country of Origin	:	Russia
	Company	:	Chumakov Center
	Production Capacity	:	Target of around 3 million doses by the end of 2021 (TASS, 2021)
	Price	:	No data
	Distribution	:	Russia (McGill COVID19 Vaccine Tracker Team, 2021)
	Type of Agreement:	:	On February 19, CoviVac, developed by the Russian Academy of Sciences Chumakov Federal Scientific Center for Research and Development of Immune and Biological Products, was registered with the Russian Ministry of Health
12	Vaccine Name	:	EpiVacCorona (Aurora-CoV)
	Country of Origin	:	Russia
	Company	:	Vector State Research Center of Virology and Biotechnology (Russia)
	Production Capacity	:	5 million doses per month (TASS, 2021)
	Price	:	US$11 (Carlson & PharmD, 2021)
	Distribution	:	No data
	Type of Agreement:	:	(2) Russia, Turkmenistan
13	Vaccine Name	:	Sputnik Light
	Country of Origin	:	Russia
	Company	:	Russian Gamaleya Center
	Production Capacity	:	Target of 700 million doses by 2021 (Ivanova &; Nikolskaya, 2021)
	Price	:	Less than $10 per dose (Precision Vaccinations Staff, 2021)
	Distribution	:	(15 Countries) Angola, Armenia, Bahrain, Belarus, Congo, Iran (Islamic Republic of), Kazakhstan, Kyrgyzstan, Mauritius, Mongolia, Nicaragua, Philippines, Russian Federation, Venezuela (Bolivarian Republic of), West Bank(McGill COVID19 Vaccine Tracker Team, 2021)
	Type of Agreement	:	No data
14	Vaccine Name	:	Kazakhstan RIBSP: QazVac
	Country of Origin	:	Kazakhstan
	Company	:	Research Institute for Biological Safety Problems
	Production Capacity	:	**50,000 doses** in the first batch, target 500-600,000 doses per month
	Price		
	Distribution	:	No data
		:	(2 Countries) Kazakhstan, Kyrgyzstan
	Type of Agreement	:	No data
15	Vaccine Name	:	Medigen/MVC-COV1901
	Country of Origin	:	Taiwan
		:	

	Company	:	Medigen Vaccine Biologics Corp.
	Production Capacity	:	The target of 20 million doses by 2021
	Price	:	No data
	Distribution	:	Taiwan
	Type of Agreement	:	No data
16	Vaccine Name	:	Serum Institute of India: Covishield (Oxford/AstraZeneca formulation)
	Country of Origin	:	India
	Company	:	Serum Institute of India
	Production Capacity	:	Target 200 million doses per month
	Price	:	Almost $12 per dose in India
	Distribution	:	(45 Countries) Afghanistan, Antigua and Barbuda, Argentina, Bahamas, Bahrain, Bangladesh, Barbados, Bhutan, Bolivia (Plurinational State of), Botswana, Brazil, Cabo Verde, Canada, Côte d'Ivoire, Dominica, Egypt, Ethiopia, Ghana, Grenada, Honduras, Hungary, India, Jamaica, Lebanon, Madagascar, Maldives, Morocco, Myanmar, Namibia, Nepal, Nicaragua, Nigeria, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Seychelles, Solomon Islands, Somalia, South Africa, Sri Lanka, Suriname, Togo, Tonga, Trinidad and Tobago, Ukraine(McGill COVID19 Vaccine Tracker Team, 2021)
	Type of Agreement	:	No data
17	Vaccine Name	:	Shifa Pharmed Industrial Co: COVID-19 Inactivated Vaccine
	Country of Origin	:	Iran
	Company	:	SHIFA PHARMED INDUSTRIAL CO.
	Production Capacity	:	Target of more than 20 million doses per month in the third phase
	Price	:	No data
	Distribution	:	Iran (McGill COVID19 Vaccine Tracker Team, 2021)
	Type of Agreement	:	No data
18	Vaccine Name	:	Sinopharm (Beijing): BBIBP-CorV (Vero Cells)
	Country of Origin	:	China
	Company	:	China National Pharmaceutical Group
	Production Capacity	:	1 billion doses in a year (Reuters, 2021)
	Price	:	No data
	Distribution	:	(64 Countries) Angola, Argentina, Bahrain, Bangladesh, Belarus, Belize, Bolivia (Plurinational State of), Brazil, Brunei Darussalam, Cambodia, Cameroon, Chad, China, Comoros, Cuba, Egypt, Equatorial Guinea, Gabon, Gambia, Georgia, Guyana, Hungary, Indonesia, Iran (Islamic Republic of), Iraq, Jordan, Kenya, Kyrgyzstan, Lao People's Democratic Republic, Lebanon, Malaysia, Maldives, Mauritania, Mauritius, Mexico, Mongolia, Montenegro, Morocco, Mozambique, Namibia, Nepal, Niger, Nigeria, North Macedonia, Pakistan, Paraguay, Peru, Philippines, Republic of the Congo, Senegal, Serbia, Seychelles, Sierra Leone, Solomon Islands, Somalia, Sri Lanka, Thailand, Trinidad and Tobago, Tunisia, United Arab Emirates, Vanuatu, Venezuela (Bolivarian Republic of), Vietnam, Zimbabwe (McGill COVID19 Vaccine Tracker Team, 2021)
	Type of Agreement	:	No data
19	Vaccine Name	:	Sinopharm (Wuhan): Inactivated (Vero Cells)
	Country of Origin	:	China
	Company	:	China National Pharmaceutical Group
	Production Capacity	:	100 million in a year (Reuters, 2021)
	Price	:	No data
	Distribution	:	(2 Countries) China, Philippines (McGill COVID-

			19 Vaccine Tracker Team, 2021)
	Type of Agreement	:	No data
20	Vaccine Name	:	Takeda: TAK-919 (Moderna formulation)
	Country of Origin	:	Japan
	Company	:	Takeda Pharmaceutical Company Limited
	Production	:	No data
	Capacity Price:	:	No data
		:	Japan (McGill COVID19 Vaccine Tracker Team, 2021)
	Distribution	:	
	Type of Agreement	:	Partnership agreement for the development, manufacture, and commercialization of NVX-CoV2373 between Novavax and Takeda, on August 7, 2020
21	Vaccine Name	:	Zydus Cadila: ZyCoV-D
	Country of Origin	:	India
	Company	:	Zydus Cadila firm
	Production Capacity	:	10,000 doses
	Price	:	approximately $4 per dose
	Distribution	:	India (McGill COVID19 Vaccine Tracker Team, 2021)
	Type of Agreement	:	Zydus Cadila Agreement with Shilpa Medicare Limited for the production of ZyCoV-D DNA-based COVID-19 vaccine

From the table 2 above, after reprocessing the hegemony of vaccine-producing countries in the international structure can be seen in the following Graph 1:

From Graph 1, there are several hegemons in the international structure based on COVID-19 vaccine manufacturers, namely:

1. From the aspect of vaccine technology development, the world hegemons are China (5), Russia (4), the United States (3), and India (3).
2. In terms of the number of consumer countries, there are three world hegemons, namely: (i) the United States with 238 countries, the United Kingdom with 122 countries, and China with 117 countries.
3. In terms of production capacity, the world hegemon is China with 7,600,000,000 doses, the United States with 5,000,000,000,000 doses, Germany with 3,000,000,000 doses, and the United Kingdom with 3,000,000,000 doses.

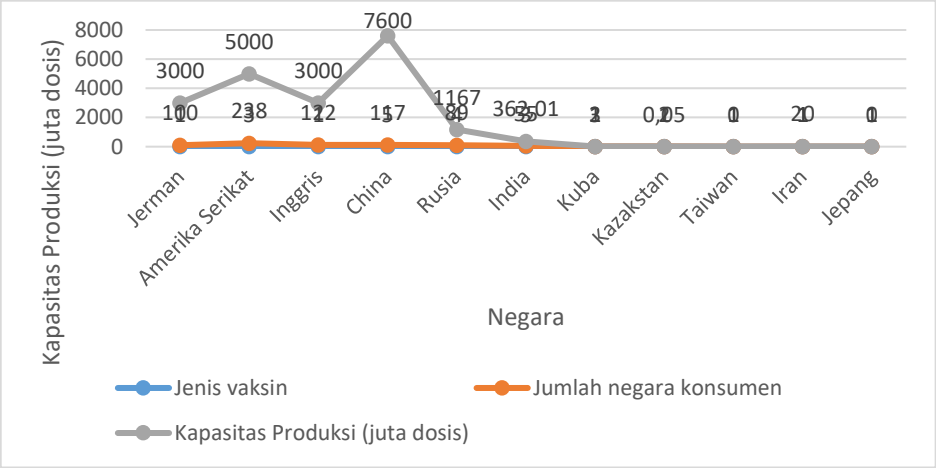

Figure 2. Covid-19 Vaccine Production (2021)

These findings illustrate the results of research related to vaccine technology development, distribution to consumer countries, and vaccine production capacity. To analyze them, we can refer to some relevant theories.

In Finding 1, which shows the dominance of China, Russia, the United States, and India in vaccine technology development, we can interpret it through the lens of Hegemonic Power Theory. This suggests that these countries have control over key resources in

vaccine development, exerting great influence in the direction of global vaccine development.

Using the Hub-and-Spoke Theory, Finding 2 can be understood, which shows that the United States, United Kingdom, and China play a significant role in the spread of vaccines to many countries, indicating that many countries depend on them to gain access to vaccines.

However, we can use International Production Theory as shown in Finding 3, which shows that China, the United States, Germany, and the United Kingdom dominate vaccine production. This suggests that these countries play an important role in the global vaccine supply chain, and have a significant influence on the vaccine supply itself.

Keep in mind that these results show that, when it comes to vaccinations being developed, distributed, and produced globally, there are a few countries that have a dominant role in each aspect, demonstrating their position in the global system.

CONCLUSION

The article concludes that (i) the world hegemons in terms of vaccine types are China, Russia, the United States, and India; (ii) the world hegemon in terms of the number of consumer countries is the United States, the United Kingdom, and China, and (iii) the world hegemon in terms of vaccine production capacity is China, the United States, Germany, and the United Kingdom. Finally, the world hegemons that meet these three criteria are China and the United States.

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