



ASIAN TRADE CENTRE

Supporting Post-COVID 19 Economic Recovery

TAIWAN'S PERSPECTIVE

Abstract

There are many lessons to learn from Taiwan's successful containment of the coronavirus. Taiwan's efficient handling of not only the COVID-19 pandemic but its ability to resuscitate and sustain its economy when most of the world was reeling under the impact of an unprecedented global lockdown has been exemplary.

The swift and proactive measures taken to tackle Covid-19 coupled with the various fiscal and incentive programmes introduced have allowed Taiwan to maintain its economic foothold in the global environment. Despite the uncertainty surrounding the evolving Covid-19 pandemic, Taiwan's economy has expanded at an unexpectedly fast pace. The resiliency of its retail and service, high-tech, medical device and airline industry has allowed Taiwan to thrive and make "lemonade" out of the "lemon" of the Covid-19 pandemic.

Sharing its successes with the international community, Taiwan has also played an integral role in global pandemic management and containment and has signalled strong commitments in working together with partners towards post-Covid-19 recovery.

The paper concludes that in the context of the post-Covid global trade system, Taiwan is a dependable and valuable strategic regional partner to the international community and should be included in regional economic integration arrangements like the Comprehensive and Progressive Trans-Pacific Partnership (CPTPP) in order to strengthen overall growth and recovery.

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1. Introduction

Taiwan's successful management of the Covid-19 pandemic has garnered it worldwide praise as a model. While the pandemic has forced countries around the world to impose strict lockdown measures, people in Taiwan have been able to maintain many of their freedoms, retaining key elements of a normal life under certain social distancing rules. The total impact of the pandemic on citizen health has been extremely modest, with only 12 recorded deaths and less than 1120 total cases by early 2021.

Effective pandemic management has boosted Taiwan's economic growth. Prior to the outbreak of Covid-19 and associated economic lockdowns around the world, Taiwan's Gross Domestic Product (GDP) per capita, based on Purchasing Power Parity (PPP), placed it 19th on the global rankings from the International Monetary Fund (IMF).¹ While many countries are likely to slide down the rankings for 2020 given economic contraction, Taiwan grew instead

Taiwan's GSP is expected to reach 4.64 percent in 2021, with an economic growth rate of 3.11 percent in 2020 which is driven by a mild recovery in global demand and Taiwan's competitiveness in integrated circuit manufacturing.² Taiwan's successful economic path has made it one of the few economies able to maintain positive economic growth amid global supply chain disruption

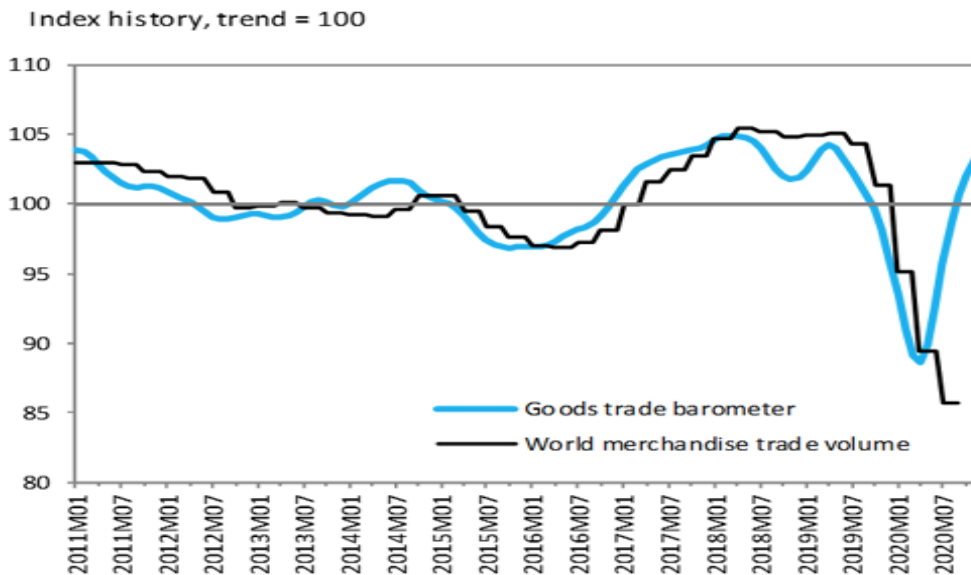
As the rest of the world tries to map out strategies to better contain the Covid-19 virus and manage economic growth, it is worth examining the approaches that Taiwan has taken for lessons that might be applicable to others in navigating the post-pandemic landscape. In part, Taiwan was simply "lucky" that the sector that has driven the bulk of its economic growth, electronics, experienced strong demand and was less affected by transport-related challenges than other sectors. But Taiwan also had to work hard to manage the pandemic impact effectively and to take advantage of opportunities for an economic rebound.

The rest of the paper will explore the ways in which Taiwan's approach to the management of the COVID-19 pandemic strengthens regional economic integration and post-pandemic recovery efforts under agreements like the CPTPP. Taiwan's increased participation in such efforts can reduce trade barriers between Taiwan and the international trade community and allow other parties to benefit from Taiwan's successes and expertise in high tech and digital healthcare industries, accelerating regional economic recovery.

2. COVID-19 and Economic Impact

The pandemic has had a significant impact on global trade flows. Referencing the latest World Trade Organization's (WTO) data shown in Figure 1, a score of 100 (represented by the gray line) suggests that global trade expansion is consistent with current trends. For scores above the gray line, this suggests growth above current trends and for scores below gray line, this suggest growth below current trends. Therefore, according to the WTO Global Trade Barometer, Figure 1 highlights that trade flows (represented by the blue line) fell significantly across 2020.³

Figure 1: WTO Global Trade Barometer



Source: World Trade Organization

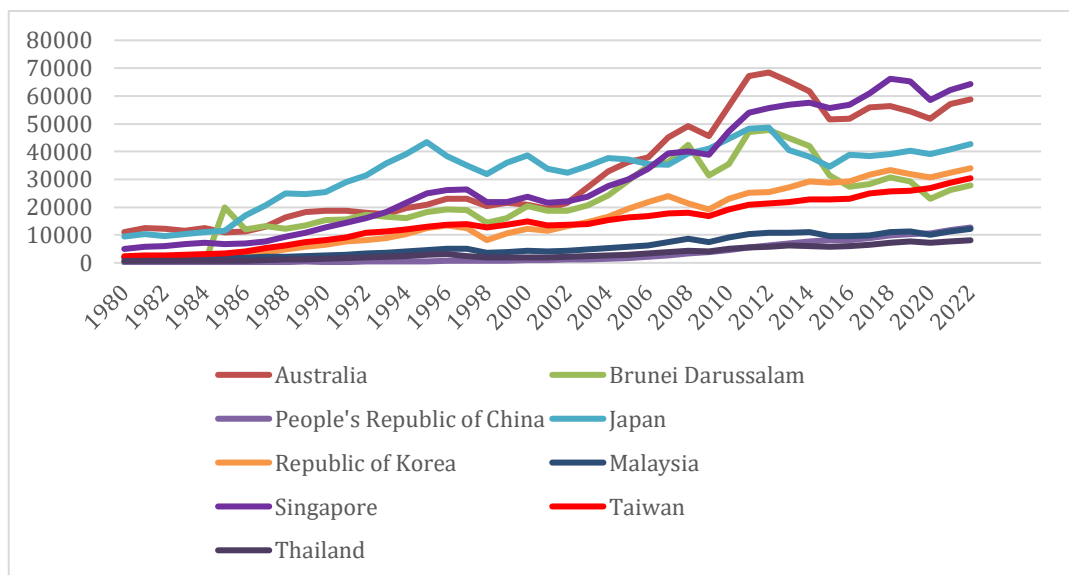
The result of the trade disruption was less than originally feared, as early forecasts from the WTO estimated damage of up to 34 percent of trade. Nevertheless, trade contraction was sharp and strongly negative for nearly all global economies. Taiwan remains an outlier in this pattern. The data suggests that Taiwan has been able to successfully leverage their capabilities to achieve growth while at the same time navigating the uncertainties of the pandemic.

Taiwan's GDP expanded by 5 percent – Ranked 3rd most competitive economy in Asia

As a result of increased exports and quick recovery in consumption due to swift measures taken to tackle Covid-19, Taiwan's economy has expanded at an unexpectedly fast pace. In comparing the data of the final quarter of 2019 and 2020, Taiwan's real GDP expanded by 5.09 percent with an overall economic growth rate of 3.11 percent in 2020.⁴ Taiwan's annual growth rate is expected to rise by 4.64 percent in 2021.⁵ The World Economic Forum's *2019 Global Competitiveness Index Rankings* placed Taiwan at 12th place amongst 141 countries and was also ranked fourth amongst all other Asian countries.⁶ Similarly, the 2020 International Institute for Management Development's annual world competitive rankings has ranked Taiwan at 11th place globally, and the third most competitive economy in the region, after Singapore and Hong Kong.⁷

Figure 2 shows that Taiwan is the only country to have experienced positive growth in GDP between 2019 to 2020 while South Korea, Singapore and Hong Kong saw their economies contract. Furthermore, for the first time in 30 years, Taiwan's economic growth surpassed China.⁸ In relation to other countries, Taiwan's nominal GDP is also comparable to Poland and Switzerland whilst its GDP per capita is higher than the Republic of Korea and Japan and comparable to that of Sweden.⁹

Figure 2: Regional Countries GDP Per Capita (Current Prices, US\$) 1980-2022

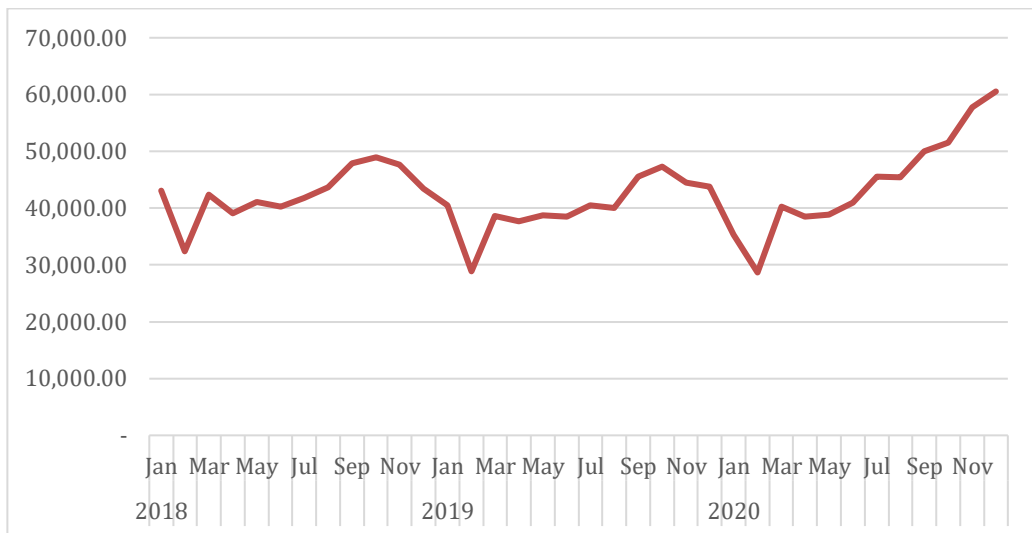


Source: IMF Datamapper¹⁰

10 percent increase in export orders in 2020

Taiwan has close trade and investment ties with countries in the region. For instance, Singapore is Taiwan's second largest trading partner, and bilateral trade has been growing over the last three years. Moreover, looking beyond the region, Taiwan has also been consistently performing well in global trade indexes. In 2019, Taiwan was the 18th leading exporter in world merchandise trade and 17th for imports.¹¹ Although most Asian economies have experienced economic slowdown in reaction to the pandemic, Taiwan witnessed an increase of 10.1% in its export orders in 2020.¹² This was its most significant increase in the last three years, reaching US\$ 533.66 billion.¹³ Focusing merely on December 2020, there was a 38.3 percent increase in export order recorded compared to the year before, making it the tenth consecutive month of year-on-year growth.¹⁴

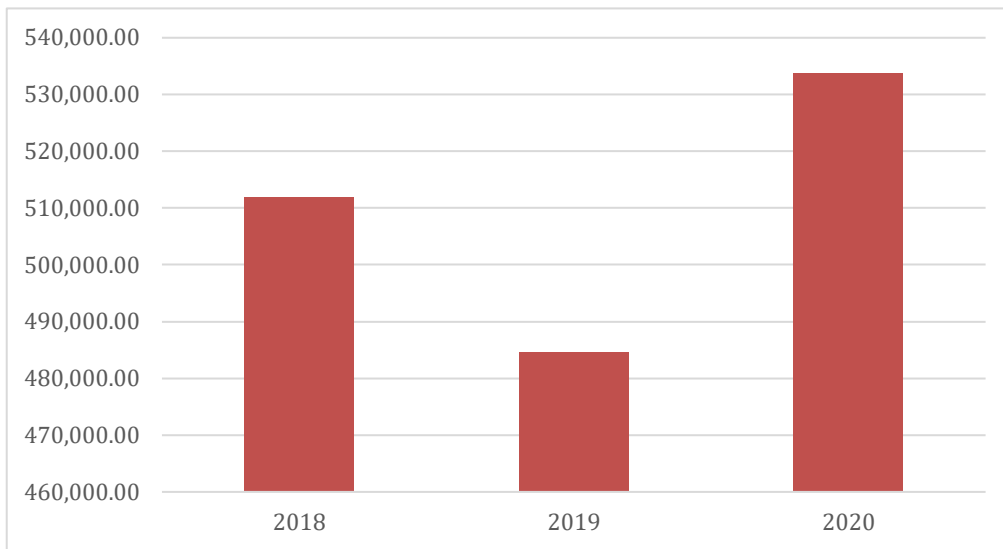
Figure 3: Taiwan Export Orders (US\$ Million) - Monthly



Source: Statistics Bureau of the Republic of China, Taiwan¹⁵

Much of the growth, as shown in Figures 3 and 4, was attributed to strong performance in its major semiconductor industry and the manufacture of electronic parts and components as well as the export of computers. The performance of other important industrial output in 2020 such as plastics, steel, petrochemical products and motor vehicles showed less impressive growth.

Figure 4: Taiwan Export Orders (US\$ Million) – Yearly



Source: Statistics Bureau of the Republic of China, Taiwan¹⁶

Electronics, and particularly semiconductors, experienced record growth because consumer demand for such products soared during the lockdown. Millions of workers were suddenly shifted to home, driving strong purchases of home office equipment and entertainment products. In addition, such products are comparatively lightweight and high value, making it possible for shipment by air cargo. Given the size of the disruption in ocean freight and the associated sudden surges in costs for space in containers, products that could be sent via air enjoyed an advantage over products moving by sea (or even by rail, given the shortage of available containers).

3. Taiwan's Strategy to Managing the Virus

Taiwan's factories would not have been able to keep humming and manage surging demand if the pandemic had caused lockdowns and other disruptions to business activity. The proactive measures by the Taiwanese government have contributed to significantly lower cases domestically compared to its neighbouring countries, helped reduce strain to its healthcare system, and allowed business activities to resume as normal.

Despite the island's proximity to mainland China where the pandemic originated and the volume of person-to-person travel and contact during the early stages of the disease spread, Taiwan managed to contain the virus with an effective disease control system. To date, the country has only reported 967 confirmed cases of

COVID-19 virus—40.6 cases per million of inhabitants—and only 9 deaths. These numbers are much lower than China, Japan and Singapore, which reported 70.24, 3,460 and 10,259 cases per million respectively.¹⁷ The effective management of the spread of the virus is the result of a model of disease control underpinned by four key factors.

3.1 Centralized Regulatory Framework for Disease Control

Taiwan's effective response to the crisis has been driven by a regulatory framework for disease control that is highly centralized and equipped with strong legal powers to direct pandemic management mechanisms.

Taiwan's experience during the SARS epidemic led the country to establish a series of key measures to manage pandemics. A 2008 reform gave Taiwan's Centre for Disease Control (CDC) the ability to establish the Central Epidemics Command Centre (CECC)—a policy-making authority given the highest national authority during pandemics to effectively mobilize government funds, military personnel, and medical resources for disease control actions.¹⁸ The CECC is led by experts who provide guidance on disease prevention measures and have policy-making authority on a range of issues including surveillance, border control, quarantine, and resource allocation.

3.2 Border Control and Individual Quarantine Measures

Given Taiwan's proximity to China, it is surprising that it has managed to contain the control of the virus without resorting to a nation-wide lockdown, a path different from those taken by some countries like China when dealing with the crises. The country was able to do so by deploying a border control and quarantine strategy as early as January 2020, before other countries in the region had in place such measures. Key measures implemented by the Taiwanese government included:¹⁹

- Quarantine measures for certain flights as early as December 2019.
- Travel bans and restrictions as early as January 2020.
- Mandatory home quarantine for 14 days for all those traveling into Taiwan.
- Provision of Taiwanese phone numbers for visitors that lacked a phone number that would enable them to effectively employ contact tracing.

3.3 Leveraging AI and Data for Contact Tracing

Digital tools have reinforced the effectiveness of disease prevention and detection measures. Taiwan's approach to digital governance helped improve disease detection through integrated databases of people's health records and travel history, more accurate contact tracing, and active surveillance tracking for people under quarantine.

Taiwan's government utilized its community surveillance system, big data from its immigration and national immigration digital databases, and mobile phone data for effective contact tracing, containment, and surveillance of people in quarantine and isolation.²⁰

The use of contract tracing technologies allowed doctors on the frontline to check their patients' travel history and, as a result, help curb the spread of the disease. Using such tools, the government was also able to conduct big data analysis to identify Covid-19 cases through travel histories and reported symptoms

3.4 Effective and Efficient Mask Production and Distribution Strategy

Taiwan was also able to solve key capital infrastructure and distribution issues required to meet mask manufacturing and distribution needs under the pandemic.

The government directly supported the infrastructure needed for rapid mask production, which essentially lowered the private sector's machinery costs. The government intervened with a US\$6.6 million subsidy and built 60 new mask production lines. When it realized that the production capacity still fell short of expectations, a second tranche of US\$3 million dollars was released to add another 32 production lines. In total, Taiwan's government added 92 new production lines in 2 months.²¹

The availability of sufficient quantities of masks and the legal infrastructure to require their use meant that Taiwan, unlike many other countries, was able to quickly implement the most critical element of Covid-19 prevention: the universal use of masks to limit airborne spread of the disease.

4. Building Economic Resilience

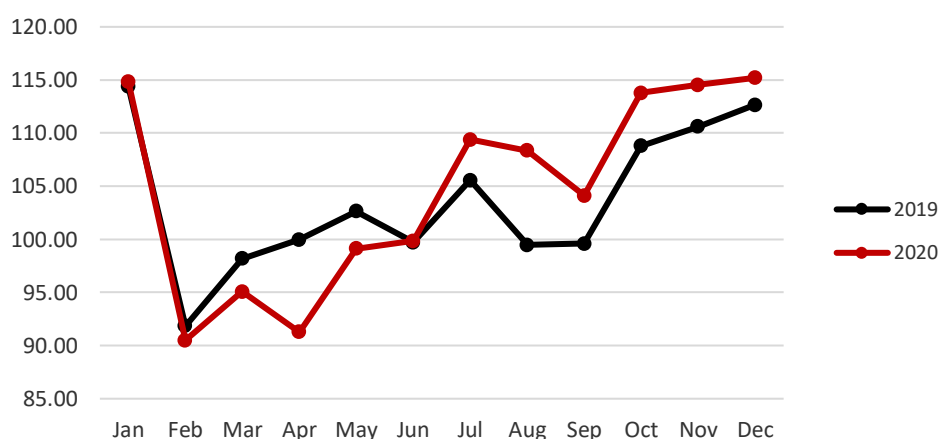
Effective management of the spread of the virus, while clearly critical to returning Taiwan to near-normal operating conditions domestically, would still have been insufficient to mitigate all the impacts of a global disease that also affected supply and demand for nearly all products and services.

To stimulate the economy, boost domestic spending, and encourage greater inbound foreign investment, various fiscal policies and incentive programmes for businesses and citizens have come into play to allow Taiwan to maintain its economic foothold in a global environment filled with uncertainty. This section highlights the resiliency of some of Taiwan’s key industries, namely the retail and service, high-tech, medical and aviation industries. The findings in this section suggest that Taiwan has not only been able to thrive during the Covid-19 pandemic but has also been formulating and executing plans to expand and future proof their key industries.

4.1 Improvement to Retail and Service Industry

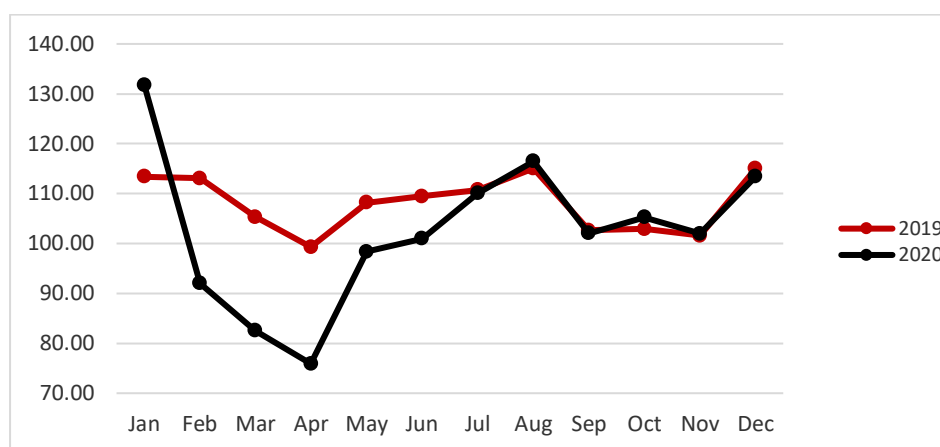
The Taiwan government budgeted NT\$ 51.1 billion for its “Triple Stimulus Voucher Program” aiming at stimulating the local economy following COVID-19.²² The programme stimulated growth in Taiwan's retail and food sales, lifting the industry from a five-month contraction from February to June.²³ As shown in Figures 5 and 6, July sales reflected poor performance in the first two quarters of 2020, but the vouchers helped reinstate sales to levels experienced prior to the pandemic.

Figure 5: Taiwan Monthly Sales Retail Index (2019-2020)



Source: Ministry of Economic Affairs, Department of Statistics, Taiwan²⁴

Figure 6: Food and Beverage Service Activities (2019- 2020)



Source: Ministry of Economic Affairs, Department of Statistics, Taiwan²⁵

4.2 High Tech Industry - Semiconductors Account for 15 Percent of GDP

As the world leader in semiconductor foundry manufacturing, Taiwan’s export of electronic components and semiconductors grew by 20 per cent year-on-year on average in the first quarter of 2020.²⁶ The industry accounted for 15 percent of Taiwan’s GDP in 2020.²⁷ This is not only a testament to the resilience of the industry but also to the Taiwanese government’s commitment to support manufacturers and meet the increasing demand for consumer electronic goods and telecommuting needs as people spent more time at home.

Taiwanese manufacturers of chip and semiconductors for smartphones like MediaTek²⁸, Taiwan Semiconductor Manufacturing Co. (TSMC)²⁹ and United Microelectronics (UMC)³⁰ have reported record high revenues in 2020. TSMC, the world’s largest contract chipmaker, recorded revenues in the last quarter of 2020 reaching NT\$361.5 billion.³¹ TSMC is one of the only two companies that has been able to produce chips with the most advanced process nodes and has been the leading manufacturer for Apple, Huawei and American military-grade chips.³² The heavy global reliance on Taiwanese firms has contributed to soaring demand across a wide range of industries.

Such strong growth of the sector has also helped drive additional investment. For example, WinWay Technology Co. Ltd (Winway), which supplies the testing interface machines to 90 percent of the world’s semiconductor manufacturers,

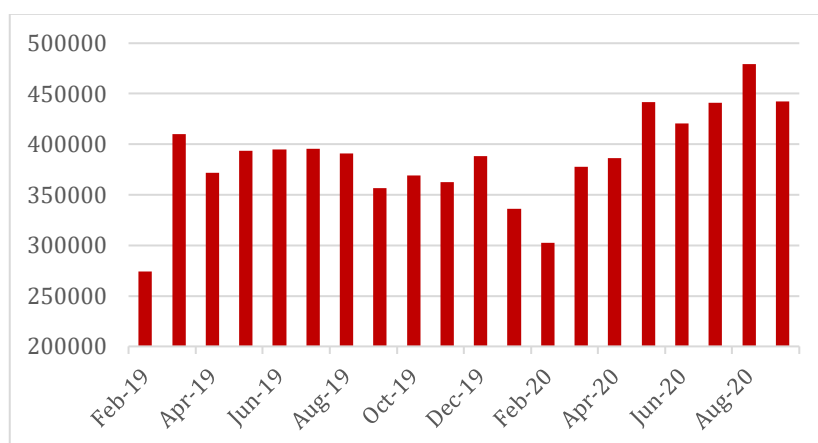
invested NT\$3.25 billion to set-up a semiconductor manufacturing facility in Nanzih Export Processing Zone (NEPZ), Taiwan.³³

4.3 Medical Device Industry – Rising Export Orders for Covid-19 Medical Supplies

Government support for biomedical innovation has allowed Taiwanese medical device manufacturers to seize the momentum to thrive in the pandemic. Figure 7 illustrates the high demand of Covid-19 medical supplies from 2019 to 2020. The production and export of medical devices that include irradiation and electromedical equipment, eyeglasses and other non-electromedical instruments had risen. Demand for personal protective equipment and devices for diagnosis and monitoring such as thermometers and physiologic monitoring devices have also surged due to the pandemic. Production for the medical device industry in 2020 is estimated at NT\$ 123 billion (US\$ 4.4 billion), an increase of 4.5% over last year.³⁴

The promulgation of Taiwan's Medical Device Management Act in January 2020 enabled low risk devices to be exempted from premarket review and allowed rapid market access for novel medical devices through shorter approval periods.³⁵ The new law introduced procedures in line with international practices and provided for greater flexibility in the manufacture of low-risk devices such as face masks that could quickly enter the market for sale after registration. This also aided recovery efforts with increasing supply of masks, protective equipment and infrared thermometers.

Figure 7: Taiwan's export of Covid -19 Medical Supplies (2019-2020)



Source: Trade Map³⁶

The high resilience of Taiwan's high-tech sector and medical device industry and its ability to cope with rising export orders has crucially enabled Taiwan to benefit from opportunities presented by the Covid-19 situation. When several cities in China were in lockdown, Taiwanese manufacturers were able to react to the increase in export orders and to fill in production gaps. Bolstered by the demand for medical equipment and supplies, the capacity of Taiwan's medical device industry in meeting export needs has heightened its integral role as part of the global public health network.

In addition, the Taiwanese government has also been strengthening the support provided to innovative startups in the biotechnology industry – one of the six core strategic industries identified – with aims to establish a strong biotechnology and medicine research and development hub focusing on precision medicine in the Asia-pacific region.³⁷ Precision medicine is one of the upcoming major trends that will transform and advance the healthcare industry.

Biobanks play an important role in the future of biomedical innovations and the development of new products. Currently, Taiwan has 32 biobanks containing an estimate of 4.5 million specimens, alongside with the use of big data from the National Health Insurance Research Database. This information, combined with Taiwan's clear lead in the use of health-related AI and big data analytics, will anchor Taiwan as a regional hub for precision medicine research and development and attract global pharmaceutical companies to collaborate.³⁸

As an example of this synergy, SmartLabs, which supports research scientists by providing pharmaceutical grade research environments, has recently partnered with Taiwan's Ministry of Science and Technology to establish a new biomedical innovation centre in Hsinchu Biomedical Science Park, Taiwan.³⁹ Working together with Taiwanese start-ups and companies like Hawk Scientific and Instant NanoBiosensors, advances Taiwan's efforts to prevent potential pandemics from escalating. Further, partnerships like these are expected to help firms navigate through the FDA testing process and expedite the commercialisation of biomedical research.

4.4 Airline Industry – Taiwan Boasts Two of the Only Four Profitable Airlines in the World

Even in an area that might otherwise be badly affected by pandemic restrictions, Taiwan has been able to capitalize on disruption of travel by filling its air carriers with cargo and driving strong domestic demand for air travel across the island. The government helped the sector with an aid package worth NT\$ 50 billion.⁴⁰ An analysis by the *Wall Street Journal* showed that only four of the world's 30 largest airlines (by revenue) recorded profits in the second quarter of 2020.⁴¹ Taiwan's EVA and China Airlines recorded profits of US\$6 million and US\$92 million respectively.⁴² Contrast these gains with net losses of US\$4.82 billion for Delta and US\$2.5 billion for American Airlines. Both Taiwanese carriers had significant cargo fleets which allowed them to meet the increased export demand for electronic devices, tech components, automobile parts, protective equipment and other Asia-made products whilst the rest of the world was in lockdown and working from home.⁴³

5. Guiding Post-Covid Economic Recovery

Taiwan has largely managed to make “lemonade” out of the “lemon” of the Covid-19 pandemic. Some of its success is attributable to being reliant on product categories that have boomed during lockdowns and being relatively less tied to sectors that have seen severe disruption like international travel and tourism. But the government has also been working proactively to leverage its existing regulatory frameworks and health systems to effectively manage the impact of the pandemic on its population. This, in turn, allowed firms to continue to operate at normal capacity and even to expand production. Their ability and capacity to manage has been bolstered by targeted spending and support programs rolled out by the government, such as voucher schemes to support domestic demand.

There are many lessons that might be learned from Taiwan's experiences navigating the disruptions since late 2019, particularly for other governments looking to establish useful regulatory frameworks to support resilience in the face of future pandemics. There are also at least two ways that Taiwan is also working to improve economic recovery efforts across the region: by facilitating pandemic management including the distribution of key medical supplies and by providing information on the skilful use of digital and other technology tools to adjust to pandemic conditions and mitigate the impact of future diseases.

5.1 International Contribution to Pandemic Management and Containment

Taiwan continues to share its experience and resources to support the containment of Covid-19 bilaterally and through relevant multilateral forums.

Given its relative success in the containment of the virus, Taiwan's approach has been recognized by the international community for its advance preparations and actions. Key government stakeholders in the U.S., New Zealand and the EU all have commended the country's ability to effectively manage the virus and share key knowledge and experiences with countries around the world.⁴⁴

Leveraging that expertise, the Taiwanese government has been ready and willing to use its excess capacity to contribute to international epidemic prevention efforts.

Under multilateral forums like APEC Taiwan has: (i) shared its measures to contain and prevent the spread of COVID-19, as well as its post-pandemic recovery plan, (ii) contributed to APEC funding for five of its 2020 pandemic prevention and post-pandemic recovery plans and (iii) donated US\$1 million to the APEC Support Fund Sub-Fund on Human Security and US\$250,000 to the APEC Sub-Fund for Digital Innovation.⁴⁵

Taiwan has also committed to donating medical equipment and anti-pandemic supplies to countries in need. By June 2020, Taiwan donated 51 million surgical masks, 1.16 million N95 masks, 600,000 isolation gowns, and 35,000 forehead thermometers to more than 80 countries.⁴⁶ In Asia-Pacific alone, Taiwan donated over 6.62 million masks to key partners as of October 2020 (Table 1).

Table 1: Taiwan and the Asia-Pacific region Cooperation and assistance to combat COVID-19 (As of Oct, 2020)

Country	Assistance
Marshall Islands	Taiwan donated 60,000 face masks to each nation and varying quantities of PCR test machines, including reagent supplies, infrared thermal imaging cameras, thermometers autonomous temperature measurement station quinine, ventilators, N95 masks, protective gowns, isolation gowns, disposable face shields and other supplies
Tuvalu	
Nauru	
Palau	
Fiji	

Country	Assistance
	cameras and 20,000 face masks.
Papua New Guinea	Taiwan donated infrared thermal imaging cameras, quinine, ventilators, and 25,000 face masks.
Singapore	Taiwan donated 1.1 million face masks and N95 masks.
Indonesia	Taiwan donated 300,000 face masks.
Philippines	Taiwan donated 800,000 face masks, N90 masks, protective gowns and isolation gowns.
Vietnam	Taiwan donated 350,000 face masks and protective gowns.
Thailand	Taiwan donated 500,000 face masks, N95 masks, protective gowns and isolation gowns.
Myanmar	Taiwan donated infrared thermal imaging cameras, protective gowns, isolation gowns, 270,000 face masks and N95 masks.
India	Taiwan and Australia agreed to preferential pricing for certain critical raw materials. Taiwan purchased one million liters of alcohol from Australia and provided Australia with three tons of non-woven fabric to produce face masks. Taiwan donated 500,000 face masks.
Japan	Taiwan donated 1.2 million face masks and N95 masks.

Source: Ministry of Foreign Affairs Republic of China (Taiwan)⁴⁷

5.2 Promoting Resilience and Networks into the Future

Taiwan is also a model for leveraging digital tools and technologies to manage the Covid-19 and future health crises. Covid-19 has accelerated the transformation of digital healthcare around the world. Digitalisation supports the creation of collaborative and proactive healthcare service delivery models required to address post-pandemic challenges. Taiwan's pool of IT engineers, first-class medical professionals and rapid development of biomedical and AI ecosystems provide valuable expertise and support needed to advance digital healthcare.⁴⁸

Taiwan's tech sector, drawing upon decades of experience in technology and healthcare, has been able to assist countries around the world by putting in place smart hospital solutions, AI-assisted medical imaging systems, diagnostic

assessment tools and point of care solutions in a relatively short time to reduce the strain in healthcare systems due to a surge in pandemic cases. Post-Covid, Taiwan's innovative application of AI solutions in healthcare could also contribute to the needs of countries facing an ageing population including those of Japan and Singapore.

Taiwan's existing and future investment plans will continue to strengthen its role as a regional strategic partner in the disease control and digital healthcare sectors

6. Conclusion

This paper has highlighted how Taiwan has successfully handled the impacts of Covid-19 by examining the government's strategy to manage the virus and the resiliency of some of Taiwan's key industries. Leveraging its Covid-19 management successes and expertise, Taiwan has also played an important role in supporting post-covid recovery with its proactive knowledge sharing and contributions through multilateral forums. Given its role to date, Taiwan could add value and strength to regional trade agreements such as the CPTPP. In the context of the post-Covid global trade system, including Taiwan in such regional economic integration arrangements will reduce trade barriers between Taiwan and the international trade community, allow existing members to benefit from Taiwan's successes and expertise in high tech and digital healthcare industries, and accelerate overall economic recovery.

Endnotes

¹ <https://data.imf.org/?sk=388dfa60-1d26-4ade-b505-a05a558d9a42>

² Directorate General of Budget, Accounting and Statistics, Executive Yuan, R.O.C. "GDP: Preliminary Estimate For 2020Q4 And Outlook For 2021".

Eng.Dgbas.Gov.Tw, 2021.

<https://eng.dgbas.gov.tw/ct.asp?xItem=46903&ctNode=3339&mp=2>.

³ See the February 18, 2021 WTO Barometer, accessed at: https://www.wto.org/english/news_e/news21_e/wtoi_18feb21_e.htm on March 10, 2021.

⁴ Directorate General of Budget, Accounting and Statistics, Executive Yuan, R.O.C. "GDP: Preliminary Estimate For 2020Q4 And Outlook For 2021".

Eng.Dgbas.Gov.Tw, 2021.

<https://eng.dgbas.gov.tw/ct.asp?xItem=46903&ctNode=3339&mp=2>.

⁵ Directorate General of Budget, Accounting and Statistics, Executive Yuan, R.O.C. "GDP: Preliminary Estimate For 2020Q4 And Outlook For 2021".

Eng.Dgbas.Gov.Tw, 2021.

<https://eng.dgbas.gov.tw/ct.asp?xItem=46903&ctNode=3339&mp=2>.

⁶ Investtaiwan.nat.gov.tw. 2020. *Invest Taiwan International Ranking*. [online] Available at:

<[⁷ Taipei Times. 2020. Taiwan up to 11th in IMD competitiveness rankings - Taipei Times. \[online\] Available at:](https://investtaiwan.nat.gov.tw/showPageeng3?lang=eng&search=3#:~:text=The%20World%20Economic%20Forum%20(WEF,South%20Korea%20and%20mainland%20China.> [Accessed 3 March 2021].</p></div><div data-bbox=)

<<https://www.taipetimes.com/News/biz/archives/2020/06/17/2003738340> > [Accessed 3 March 2021].

⁸ Ellis, S. and Wu, D., 2021. *Taiwan's GDP Growth Outpaces China's for First Time in 30 Years*. [online] Bloomberg.com. Available at:

<<https://www.bloomberg.com/news/articles/2021-01-28/taiwan-set-to-reclaim-economic-lead-over-china-but-only-briefly> > [Accessed 2 March 2021].

⁹ Government Portal of Republic of China, Taiwan. n.d. [online] Available at: <https://www.taiwan.gov.tw/content_7.php > [Accessed 3 March 2021].

¹⁰ International Monetary Fund. "GDP Per Capita, Current Prices (U.S. Dollars Per Capita)". IMF Datamapper, 2021.<<https://www.imf.org/external/datamapper/NGDPDPC@WEO/AUS/BRN/JPN/CHN/KOR/MYS/SGP/THA/TWN?year=2021> >[Accessed on 20 April 2021].

¹¹ World Trade Organisation, 2019. *World Trade Statistical Review 2019*. [online] Geneva. Available at: <https://www.wto.org/english/res_e/statis_e/wts2019_e/wts2019_e.pdf > [Accessed 4 March 2021].

¹² Department of Statistics of the Republic of China, Taiwan. "Export Orders in December 2020," 20 January 2021. https://www.moea.gov.tw/Mns/dos_e/bulletin/Bulletin_En.aspx?kind=14&html=1&menu_id=6744&bull_id=8310 [Accessed on 19 February 2021].

¹³ Pei-Chi, L. and Huang, F., 2021. *Taiwan's export orders hit new high in 2020*. [online] Focustaiwan.tw. Available at: <<https://focustaiwan.tw/business/202101200022> > [Accessed 3 March 2021].

¹⁴ ibis

¹⁵ Department of Statistics, Ministry of Economic Affairs, 2021. *Export Orders Survey (Monthly)*. [online] Available at: <<https://dmz26.moea.gov.tw/GMWeb/investigate/InvestigateBA.aspx?lang=E> >[Accessed 20 April 2021].

¹⁶ Department of Statistics, Ministry of Economic Affairs, 2021. *Export Orders Survey (Yearly)*. [online] Available at: <<https://dmz26.moea.gov.tw/GMWeb/investigate/InvestigateBA.aspx?lang=E> >[Accessed 20 April 2021].

¹⁷ <https://ourworldindata.org/coronavirus/country/taiwan?country=~TWN>

¹⁸ <https://www.liebertpub.com/doi/10.1089/HS.2020.0095>

¹⁹ <https://www.mei.edu/publications/taiwans-model-combating-covid-19-small-island-big-data>

²⁰ Yen, Wei-Ting. "Taiwan's COVID-19 Management: Developmental State, Digital Governance, and State-Society Synergy." *Asian Politics & Policy* 12, no. 3 (2020): 455-468.

²¹ Yen, Wei-Ting. "Taiwan's COVID-19 Management: Developmental State, Digital Governance, and State-Society Synergy." *Asian Politics & Policy* 12, no. 3 (2020): 455-468.

²² See the official website for the programme at: <https://3000.gov.tw/> accessed 10 March 2021. The voucher scheme was expanded over 2020 and wrapped up at the end of the year.

²³ Flor Wang and Yu Hsiang. Central News Agency, "Vouchers, coupons nearly triple business revenue," 29 October 2021. <https://focustaiwan.tw/business/202010290015> accessed on 19 February 2021.

²⁴ Department of Statistics, 2021. *Sales of Wholesale, Retail and Food Services in February 2021*. [online] Moea.gov.tw. Available at: <https://www.moea.gov.tw/Mns/dos_e/bulletin/Bulletin_En.aspx?kind=15&html=1&menu_id=6745&bull_id=8593> [Accessed 20 April 2021].

²⁵ Department of Statistics, 2021. *Sales of Wholesale, Retail and Food Services in February 2021*. [online] Moea.gov.tw. Available at: <https://www.moea.gov.tw/Mns/dos_e/bulletin/Bulletin_En.aspx?kind=15&html=1&menu_id=6745&bull_id=8593> [Accessed 20 April 2021].

²⁶ Ma, T., 2020. *Understanding Taiwan: Post-pandemic tech opportunities and some complications*. [online] DBS. Available at: <https://www.dbs.com/aics/templatedata/article/generic/data/en/GR/072020/200707_insights_understanding_taiwan.xml> [Accessed 3 March 2021].

²⁷ Kuo, Y. and Klingler-Vidra, R., 2021. Post Covid-19 Taiwan in the Global Semiconductor Industry: The Context of the new U.S administration. *Taiwan Insight*, [online] Available at: <<https://taiwaninsight.org/2021/02/16/post-covid-19-taiwan-in-the-global-semiconductor-industry-the-context-of-the-new-u-s-administration/>> [Accessed 2 March 2021].

²⁸ Mediatek. "2020 Q3 Financial Results." <https://corp.mediatek.com/investor-relations/investor-relation-news/2020-q3-financial-results> accessed on 19 February 2021.

²⁹ Ralph Jennings. "Taiwan Chipmaker TSMC Revenues Hit Record High In 2020; Stocks Follow," 11 January 2021. Forbes, <https://www.forbes.com/sites/ralphjennings/2021/01/11/taiwan-chipmaker-tsmc-revenues-hit-record-high-in-2020-stocks-follow/?sh=6b0bc4954307>

³⁰ Lisa Wang, "UMC To Become World'S No. 3 Foundry: Researcher", *Taipei Times*, 2020, <https://www.taipeitimes.com/News/biz/archives/2020/12/08/2003748296>.

³¹ *Businesstimes.com.sg*. 2021. *TSMC's quarterly revenue hits record on strong iPhone demand*. [online] Available at: <<https://www.businesstimes.com.sg/technology/tsmcs-quarterly-revenue-hits-record-on-strong-iphone-demand> > [Accessed 3 March 2021].

³² Kuo, Y. and Klingler-Vidra, R., 2021. Post Covid-19 Taiwan in the Global Semiconductor Industry: The Context of the new U.S administration. *Taiwan Insight*, [online] Available at: <<https://taiwaninsight.org/2021/02/16/post-covid-19-taiwan-in-the-global-semiconductor-industry-the-context-of-the-new-u-s-administration/> > [Accessed 2 March 2021].

³³ Ministry of Economic Affairs, R.O.C, 2021. *The hidden semiconductor champions, WinWay Technology Co., Ltd.'s new plant just broke ground in January*. [online] Moea.gov.tw. Available at: <https://www.moea.gov.tw/MNS/english/news/News.aspx?kind=6&menu_id=176&news_id=93301 > [Accessed 3 March 2021].

³⁴ Chen Fuxia. *CTimes*, "Industrial Technology Research Institute IEKCQM: Long distance, staying at home, and regulations are the main challenges of the medical device industry," 4 November 2020. <http://www.ctimes.com.tw/DispNews/tw/%E5%80%8B%E4%BA%BA%E5%8C%96%E9%86%AB%E6%9D%90/%E5%B7%A5%E7%A0%94%E9%99%A2/IEKCQM/%E9%86%AB%E7%99%82%E5%99%A8%E6%9D%90/2011041901JU.shtml> accessed 19 February 2021.

³⁵ Tony Tung-Yang Chang. Mondaq, "Taiwan's Medical Device Management Act Was Promulgated On January 15, 2020," 23 January 2020.

<https://www.mondaq.com/life-sciences-biotechnology-nanotechnology/886346/taiwan39s-medical-device-management-act-was-promulgated-on-january-15-2020> accessed on 19 February 2021.

³⁶ International Trade Centre, 2021. *Trade Map - Trade Statistics for International Business Development*. [online] Trademap.org. Available at: <https://www.trademap.org/Country_SelCountry_MQ_TS.aspx?nvpm=1%7c490%7c%7c%7cTOTAL%7c%7c%7c2%7c1%7c1%7c2%7c2%7c3%7c2%7c1%7c1%7c1> [Accessed 20 April 2021].

³⁷ National Development Council (NDC). "Program for Promoting Six Core Strategic Industries." https://www.ndc.gov.tw/en/Content_List.aspx?n=2D827BFE7E3598BE&upn=4D3DA452D04C42CC accessed on 23 February 2021.

³⁸ Chuang, B. and Ke, W., 2020. *Taiwan revving up to become biomedical R&D base in Asia Pacific*. [online] DIGITIMES. Available at: <<https://www.digitimes.com/news/a20200715PD204.html>> [Accessed 3 March 2021].

³⁹ Business Wire, 2020. *SmartLabs Launches Global Accelerator in Taiwan, Fostering International Biomedical Innovation*. [online] Businesswire.com. Available at: <<https://www.businesswire.com/news/home/20200427005074/en/SmartLabs-Launches-Global-Accelerator-in-Taiwan-Fostering-International-Biomedical-Innovation>> [Accessed 3 March 2021].

⁴⁰ Reuters. "Taiwan airlines to get \$1.6 billion help, more stimulus may be coming," 19 March 2020. <https://www.reuters.com/article/us-health-coronavirus-taiwan-president-idUSKBN2160OR> accessed on 19 February 2021.

⁴¹ Jeong, E., 2020. *How a Fortunate Few Airlines Profit in a Pandemic: Lots of Cargo*. [online] WSJ. Available at: <<https://www.wsj.com/articles/how-a-fortunate-few-airlines-profit-in-a-pandemic-lots-of-cargo-11600779463>> [Accessed 2 March 2021].

⁴² Jeong, E., 2020. *How a Fortunate Few Airlines Profit in a Pandemic: Lots of Cargo*. [online] WSJ. Available at: <<https://www.wsj.com/articles/how-a>

[fortunate-few-airlines-profit-in-a-pandemic-lots-of-cargo-11600779463](https://www.wsj.com/articles/how-a-fortunate-few-airlines-profit-in-a-pandemic-lots-of-cargo-11600779463) >
[Accessed 2 March 2021].

⁴³ Jeong, E., 2020. *How a Fortunate Few Airlines Profit in a Pandemic: Lots of Cargo*. [online] WSJ. Available at: <<https://www.wsj.com/articles/how-a-fortunate-few-airlines-profit-in-a-pandemic-lots-of-cargo-11600779463>>
[Accessed 2 March 2021].

⁴⁴ <https://thediplomat.com/2020/04/taiwans-health-diplomacy-didnt-start-with-the-covid-19-crisis/>

⁴⁵ <https://en.mofa.gov.tw/cp.aspx?n=2318>

⁴⁶ <https://thediplomat.com/2020/09/recover-better-together-taiwan-can-help/>

⁴⁷ https://ws.mofa.gov.tw/001/Upload/OldFile/UserFiles/files/Taiwan%20and%20the%20Asia-Pacific_1102.pdf

⁴⁸ BBC, “The Taiwanese medtech transforming healthcare”.
<http://www.bbc.com/storyworks/future/transforming-taiwan/the-taiwanese-medtech-transforming-healthcare?fbclid=IwAR3eFXctNHfezRgFKwCowcCeNsB4JLEDSezLwx-JAKE0uAskK3laTA2jYzc> accessed on 26 January 2021