EUROPEAN CLUSTER COLLABORATION PLATFORM

Clusters and Important Values Chains with Singapore

Note on recent developments and market opportunities for the EU

An initiative of the European Union

Authors:

Dr. Jan-Philipp Kramer (Prognos)

Lennart Galdiga (Prognos)

Maximilian Welford (Prognos)

Brussels, 16.09.2022

Content

Executive Summary

This paper presents observations on Singapore's economic structure, its cluster ecosystems and initiatives that foster growth and innovation. By further referencing some key statistics on the export and import trade between Singapore and the EU27, this paper may pose considerations on prospective collaborations in the future.

Economy and Sectors in Singapore

- The high levels of GDP in Singapore are constituted by a strongly diversified economy. The services sector dominates the economy in Singapore, with trade, business services, transportation, communications as well as financial services make up a large proportion of growth. The considerably low level of activity in the agricultural sector has made Singapore vulnerable to shocks, driving the island state to funnel extensive investment in high-tech farming that would cover more domestic nutritional needs.
- Port of Singapore as one of the most important regional commercial hubs in the world, ranking second to Hong Kong in total volume of container transhipment traffic.

Trade with the EU27: Prospects for EU27 Linkages

- Singapore has become the EU's fifth largest trading partner, defined by diverse exports and imports of goods in manufacturing, machinery, chemicals and many more.
- The trade basis between the EU and Singapore has been made easier thanks to the EUSFTA. This has specifically facilitated investment, whilst alleviating customs duties and bureaucracy for EU Exports to Singapore.

Singapore Cluster and Industry Programmes: Reimagining Value Chains

- Singapore's unique location and creative way of utilising it to its own advantage has yielded great economic growth and attracted increased investment from both foreign and domestic actors. Particularly the Singapore government aims to enable growth on a sustainable basis, and consistently initiates programmes and projects to set objectives, instruments, and evaluation processes. E.g.:
    - Industry Transformation Programme (ITP)
    - Research Innovation Enterprises 2025 Plan (RIE2025)
- EU-Singapore relations could provide further prospects of intensifying existing linkages, particularly for cluster-based projects.

01

Economy and Sectors in Singapore

1. Economy and Sectors in Singapore

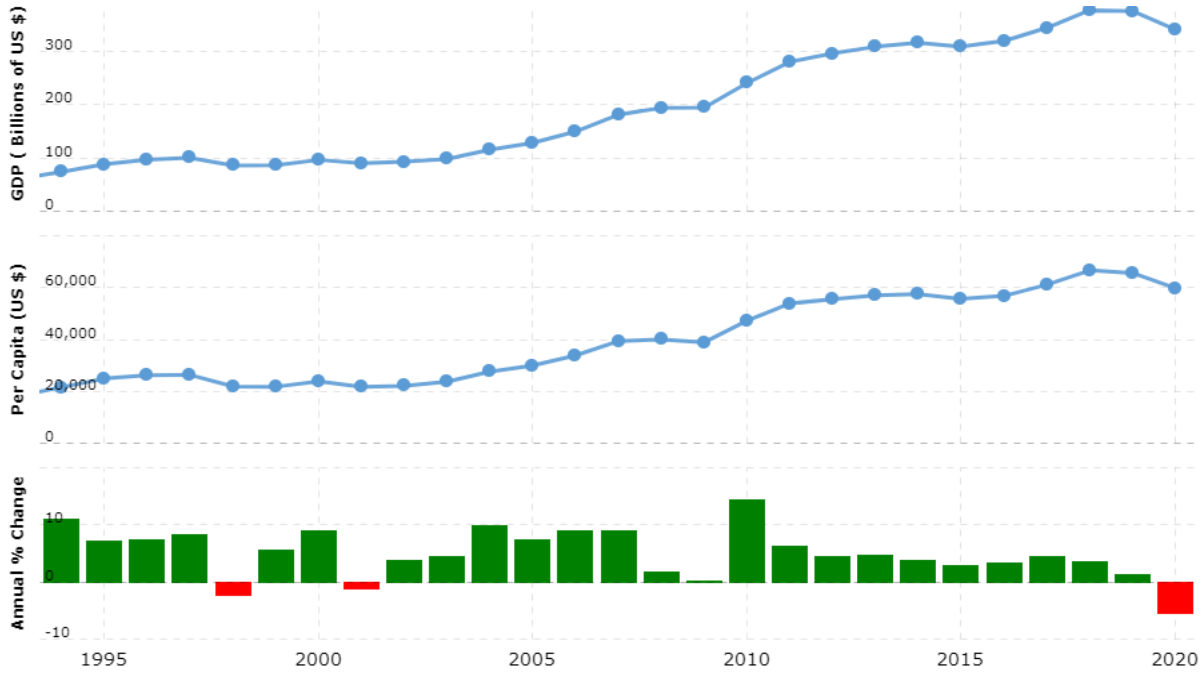
This section provides a thorough context about the socio-economic state of Singapore. We will also elaborate on the past and current state of trade flows as well as chain flows of Singapore, whilst underlining the stand-out sectors that contribute to its economy.

Singapore's economic structure

In the context of this input paper, it is important to internalise the uniqueness of Singapore in terms of its economic structures, innovation-driven commerce, and governmental policies. This is of particular concern to the EU, as Singapore has become a significant trading partner to many EU Member States. On a general note, the **economy in Singapore is defined by its effective financing and openness.** Therefore, Singapore's economy is largely oriented around trade, with diverse industrial sectors contributing to high levels of growth.

As seen in the Graph(s) below (Figure 1), **Singapore's GDP and GDP per capita perform relatively high**. This is mirrored in its GDP growth rate, in which Singapore has consistently yielded positive turnovers (see Figure in Annex), in absence of financial crises such as the Asian Financial crisis in 1997-98, the 2001 Recession, the Financial Crisis of 2007-08, and most recently the impact of the COVID-19 pandemic.

Figure 1: Singapore GDP 1995-2020



Source: World Bank (2022)

While Singapore's reliance on trade makes its economy vulnerable to shocks, it has also proven to be resilient, with the IMF forecasting post-pandemic growth rates of 3.2% in 2022 and 2.7% in 2023, respectively[1].

Key industrial sectors

The high levels of GDP in Singapore are constituted by a **strongly diversified economy,** with the services sector the contributing to 70.9% of its GDP, as well as employing 84.1% of the active working population[2]. Hereby, service sub-sectors such as trade, business services, transportation, communications as well as financial services make up a large proportion of it. Crédit Agricole Group further cites the Port of Singapore as one of the most important regional commercial hubs in the world, ranking second to Hong Kong in total volume of container transhipment traffic.

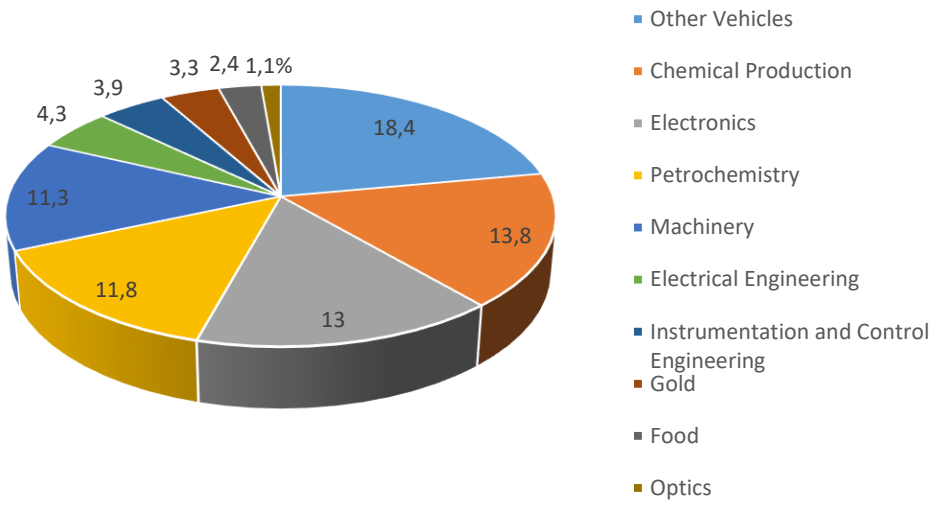
The **industrial sector is also important to the Singaporean economy**, accounting for 24.4% of GDP, whilst employing 15.2% of the active population[3]. This specifically encompasses *biomedical sciences, logistics, transport engineering* and especially *electronics & petrochemicals*, with the latter two contributing most significantly to this industrial sector.

Although the **agricultural sector is considerably low, employing 0.7**% of the workforce, the island nation has shown signs of boosting its food security through increased domestic production. Drawing on an article from the MIT Technology Review, investment in high-tech farming has been driving this change in policy, with the government aiming to **produce 30% of its national nutritional needs by 2030**[4]. While currently only producing 10% of its national nutritional needs, Singapore leads the way in the **foodtech industry** in the SEA region and is well-placed to helm the development of the regional industry. On a specific note, the relevant areas of development in this sector are plant-based protein and dairy products, which are in the early-stages of commercialisation, and lab-based protein products, which are still in early-stage R&D. The potential for the sector is based on the agrarian capabilities countries like Myanmar or Cambodia and R&D, innovation, and a conducive manufacturing ecosystem in Singapore.

[1] Crédit Agricole Group (2022). Singapore: Economic and Political Overview. Available under: Economic and political overview in Singapore (groupecreditagricole.com)
[2] The World Bank (2022) Services, value added (% of GDP) – Singapore. Available under: Services, value added (% of GDP) - Singapore | Data (worldbank.org)
[3] The World Bank (2022) Industry (including construction), value added (% of GDP) – Singapore. Available under: Industry (including construction), value added (% of GDP) - Singapore | Data (worldbank.org)
[4] MIT Technology Review (2020). Inside Singapore's huge bet on vertical farming. Available under: Inside Singapore's huge bet on vertical farming | MIT Technology Review

On a general note, Singapore's diversity in industrial sectors has further enabled the respective industries to build up a potent **export capacity** as seen in the following chart.

Figure 2: Export goods Singapore - Share of total exports in %



Source: ECCP (2022), own calculation based on UN Comtrade Database

As can be seen above, the **chemical industry** is a notable sector in Singapore, ranking 8th among the largest exporters of Chemicals in 2019. Its capacities also constitute:

- 1.5 million Barrels of Oil Refined per day
- 100 chemical and energy companies > S$1,3 billion, making it 1/3 of Manufacturing Output
- China as the biggest Export Market
- Year over Year analysis of chemical output change: 12,3%

All in all, the **diverse sectors** in Singapore not only assist the island state from being overly dependent on one output, but also enables its economy to be more resilient. For example, the shock triggered by the COVID-19 pandemic underlined this necessity, in which the output of many sectors of the economy shrank (in Singapore e.g., Construction, Retail Trade, Real Estate, as well as Food & Beverage Services)[5]. Nevertheless, it also showcased how important digitalisation is for a resilient and stable economy, with opportunities in Robotics, Deep Tech, Manufacturing as well as Finance & Insurance thriving in Singapore during said crisis. Taking this into consideration, the example of Singapore demonstrates decisive characteristics of a forward-thinking economy, from which the EU could not only benefit from in terms of trade, but also a shared vision of the future.

[5] Economic Survey of Singapore (2020). MTI Ministry of Trade and Industry Singapore. Available under: Economic Survey of Singapore 2020 (mti.gov.sg)

02

EU Trade with Singapore: Prospects for EU27 linkages

EUROPEAN CLUSTER COLLABORATION PLATFORM

Strengthening the European economy through collaboration

2. EU Trade with Singapore: Prospects for EU27 linkages

Trade is a key indicator when it comes to measuring economic growth. As mentioned in the previous chapter, a large portion of Singapore's economy runs on the foundation of and the opportunities that arise through trade. It possesses over a widely international network of trading partners, whilst **trading more than €550 billion annually**.

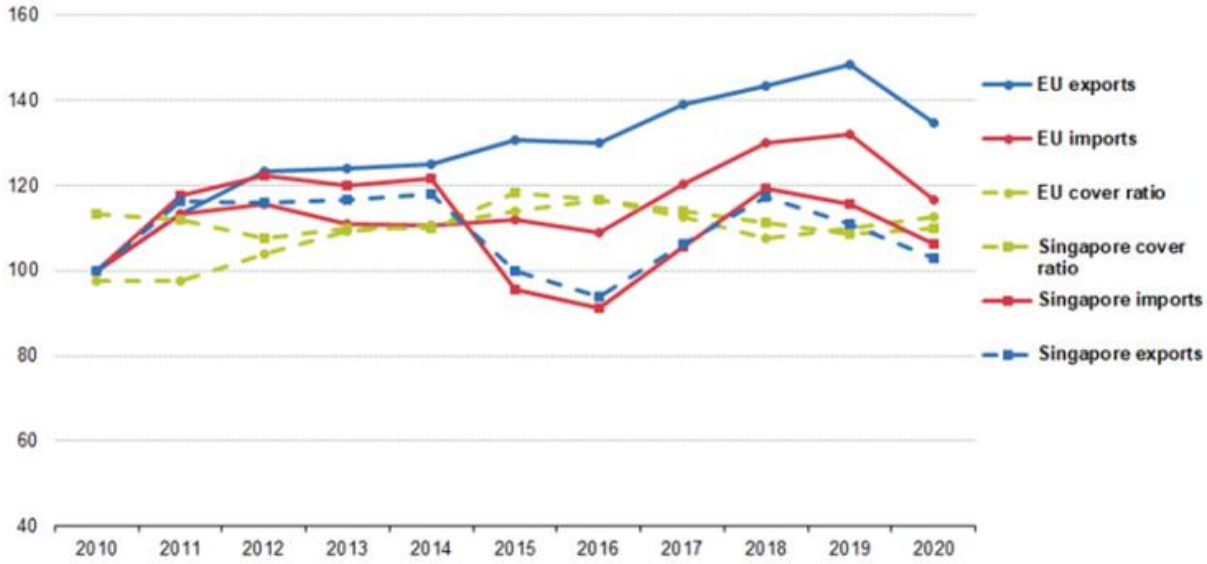
EU and Singapore Trade: Analysis of trade structure

The variety of sectors and high level or productivity of Singapore's open market have formed wide-ranging industrial ecosystems and enable businesses to thrive in an innovation-driven environment. This, together with its unique vantage point for trade in the ASEAN / Asian region, has attracted investment among foreign companies and collaborative efforts from countries around the world[6]. In parallel, the European Union's shared single market, common trade policy and openness also has prioritised integrating into global markets for sourcing and exporting goods. With Singapore's dominantly service-driven economy, it has become the **EU's fifth largest trading partner**, whilst holding two thirds of its direct investment stock in the Southeast Asian region. As this paper falls within the bounds of the European Cluster projects, it is important to gain an account of the specific European Union – Singapore trade relationship and which opportunities these present to companies.

The Lisbon Treaty of 2007 stands out as a key instrument that helped the EU to build this relationship with Singapore, with the **EU-Singapore Free Trade Agreement** following **in 2019**. This has enabled increased market access for EU-Singapore businesses, facilitated trade to expediate green technology trade and investment, as well as removing customs duties and bureaucracy for EU exports to Singapore. Drawing on Eurostat data, Figure 3 showcases how exports between 2010 and 2019 reached its highpoint in 2019 (149), with the cover ratio at its highest in 2016 (116%). Here one can also see how trade between the EU and Singapore has overall been on an upward trajectory. In 2020 a sharp decrease in trade can be seen, potentially as a consequence from the COVID-19 pandemic which saw a significant disruption in global financial systems.

[6] 10 Reasons Why Singapore is an Attractive Investment Destination. Crowe (2020). Available under: PowerPoint Presentation (crowe.com)

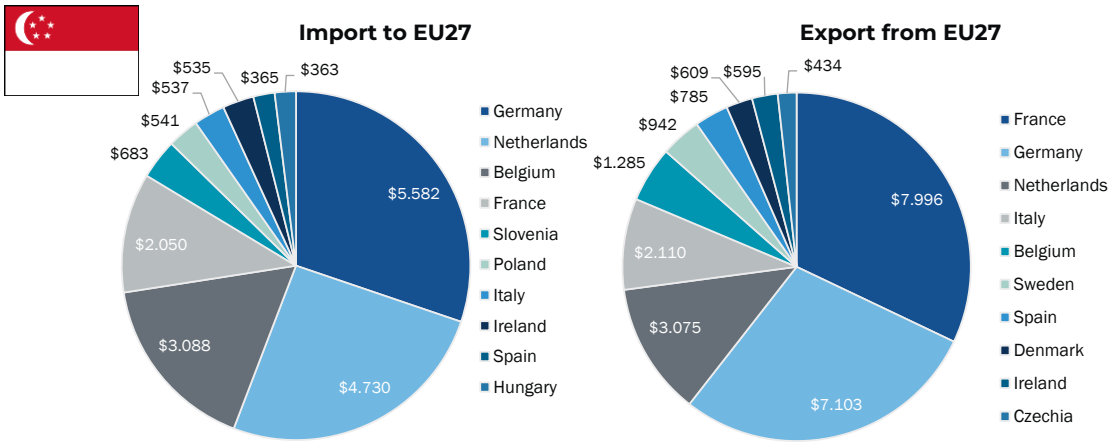
Figure 3: Trade in goods of the EU and Singapore, 2010-2020 (exports and imports indexed at 100 in 2010, cover ratio in %)



[7]Source: Eurostat and UNCTAD (2022)

To gain a more detailed account on the trade flows between the EU and Singapore, one can look at the **10 most important trading partners** on an individual basis (Figure 4). In the year of 2020, Germany stands out as a key country, ranking the highest in import and second highest in export. More specifically, Germany imports up to $5.6 billion worth of goods from Singapore, which stands out as more than a quarter of total from Singapore to the EU.

Figure 4: Overview of the 10 most important EU27 trading partners for Singapore, by Import to EU27 and Export from the EU27 in 2020, values in Billion USD



Source: ECCP (2022), own calculation based on UN Comtrade Database

Meanwhile, the Netherlands, Belgium, and France together account for more than 50% of total imports from Singapore. Thereby, the Netherlands imported $4.7 billion worth of goods, Belgium imported goods from Singapore amounting up to $3.1 billion and France

[7] Trade balance holds information on the absolute value of tradition positions. Yet the cove ratio showcases a relative measure based on the ratio (communicated in %) between the value of exports and imports, respectively. If Exports are higher than imports, then the cover ratio is above 100. (CFI, 2022)

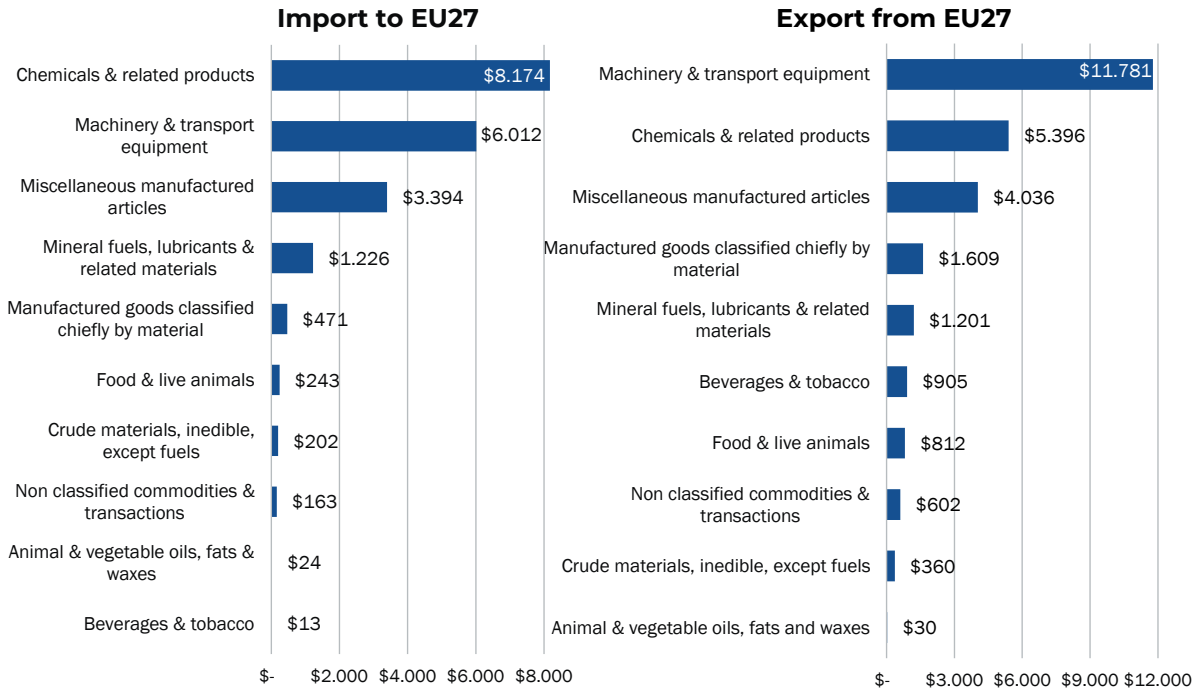
accounted for imports of $2.05 billion. In terms of exports, France have also accounted for the majority of exports from the EU27 to Singapore in 2020. Nevertheless, the total value of $7.996 billion goods exported to Singapore exceeds the French imports from Singapore. The Netherlands and Italy together account for nearly a quarter of Singapore exports to the EU, with the former exporting goods with a value of $3.075 billion and the latter's exports amounting to $2.11 billion.

Based on our analysis based on data from the UN Comtrade Database the **imports of the EU27 from Singapore amounted to $19.9 billion in 2020** and the **EU27 exports to Singapore to around $26.7 billion** resulting in a trade balance of $6.8 billion. Compared to the trade balance of 2019 a decrease in the trade volume can be constituted which to a large extent can be linked to the economic implications of the COVID-19 pandemic. In 2019 the EU27 imports totalled to almost $22.2 billion and the exports to Singapore to more than $31.4 billion resulting in a trade balance of $9.2 billion in 2019.

EU and Singapore Trade: Analysis by industry and type of goods

In linkage with the EUSFTA agreement mentioned afore, one can highlight how this instrument removed trade obstacles and facilitated trade in key goods such as electronics, food products and pharmaceuticals. Particularly in the context of these sectors, Singapore is a valuable trading partner to the EU (14th largest), with the services standing out as the 5th largest for the EU market. Agri-food products via import EU are also of significant value to Singapore, with €1.9 billion worth of products exported from the EU. This makes Singapore the fifth largest agri-food export market of Europe in Asia, and ranking 18th worldwide, respectively. As we further examine the **imports and exports by traded goods** (Figure 5), one can see how in 2020, the highest amount of goods imported from Singapore to the EU27 were Chemicals, followed by machinery & transport equipment.

Figure 5: Overview of the top 10 traded goods between the EU27 & Singapore, by Import to EU27 and Export from EU27 in 2020, values in Billion USD



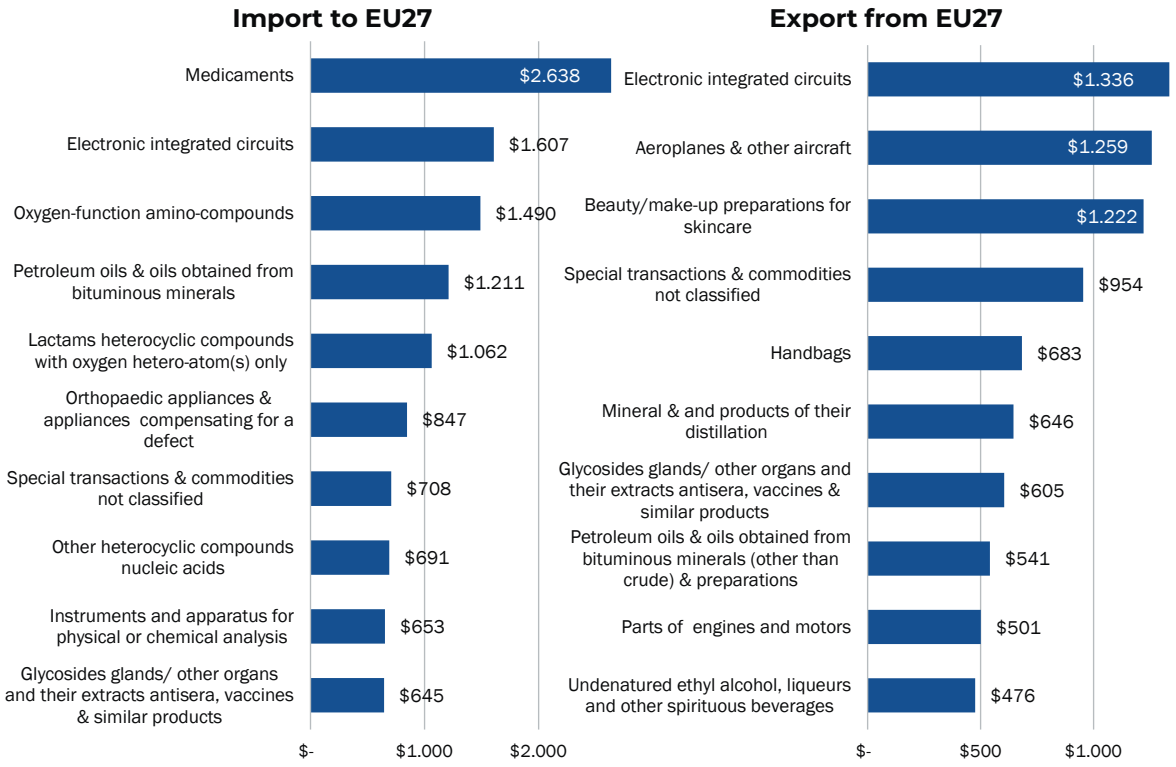
Source: ECCP (2022), own calculation based on UN Comtrade Database

Thereby, most of the imports of chemicals are linked to Germany, Belgium and Slovenia and the majority of imported machinery and transport equipment to the Netherlands, Germany and France. The relevance of the chemical industry in East Asia will significantly increase in the future according to economic models from Prognos[8] that forecast a doubling of gross value added until 2045. Other relevant goods that contribute significantly to the EU27 imports from Singapore are miscellaneous manufactured articles ($3.394 billion), and Mineral fuels lubricants & related materials ($1.226 billion). These four traded goods have made up approximately 94% of all imports of the EU27 Member States from Singapore in 2020. Similar to the chemical industry economic models from Prognos forecast a significant increase of the importance of sectors related to machinery, vehicles and transport equipment in East Asia until 2045. Meanwhile, Machinery & transport equipment ($11.781 billion), Chemicals ($5.396), and Miscellaneous manufactured articles ($4.036 billion), make up nearly 80% of all exported goods from the EU27 to Singapore. The majority of the exported Machinery & transport equipment originates from Germany, France and the Netherlands. France, Germany, and Belgium account for most of the chemicals exported to Singapore.

In addition to the previously shown analyses of traded goods, Figure 6 provides a more detailed overview of the trade between the EU27 and Singapore broken down to specific **commodities**.

[8] https://www.prognos.com/en/project/prognos-economic-outlookr-peor

Figure 6: Overview of the 10 most important commodities traded by Import to the EU27 and Export from the EU27 in 2020, values in Billion USD



Source: ECCP (2022), own calculation based on UN Comtrade Database

The most important commodity imported to the EU in 2020 were medicaments with a value of around $2.6 billion of which the majority ($1.4 billion) were imported to Germany. Slovenia imported medicaments from Singapore in the value of around $600 million in 2020. According to Prognos economic models that forecast an increase of 70% of the pharmaceutical industry in East Asia until 2045 this sector will gain relevance albeit to a smaller extent compared to the chemical industry as mentioned before. Among the three most important imported commodities in 2020 were also electronic integrated circuits ($1.6 billion) and oxygen-function amino-compounds ($1.5 billion). While the prior is used in almost all electronic equipment oxygen-function amino-compounds are used in the production of hormones, neurotransmitters, and enzymes.[9] The majority ($1 billion) of the electronic integrated circuits are imported by the Netherlands. Germany ($714 million) and Belgium ($675 million) account for most of the imported oxygen-function amino-compounds. Prognos economic models forecast a strong increase of the importance of manufacturing of computer, electronic and optical products as well as electrical equipment in East Asia with gross value added growing almost 140% until 2045.

Electronic integrated circuits are with a value of $1.3 billion also among the most important commodities exported from the EU27 to Singapore. Here, the exports of this commodity from France, Germany, and Italy account for 75% of all electronic integrated circuits

[9] Oxygen Amino Compounds (2022). OEC.world. Available under: https://oec.world/en/profile/hs/oxygen-amino-compounds (last access 23.05.2022)

exported from the EU27 to Singapore in 2020. The exports of aeroplanes and other aircrafts to Singapore are linked solely to three countries: France ($1 billion), Spain ($180 million) and Italy ($13 million). Beauty/make-up preparations for the care of the skin are with a value of $1.2 billion the third most important exported good to Singapore from the EU27. Thereby, the majority of those exports are linked to France ($1.1 billion) which indicates the importance of the Singaporean market for the French cosmetic industry.

Drawing on an **alternative data source** from Eurostat, one can see how **EU imports and exports** with Singapore in machinery & vehicles, energy, raw materials, and other manufactured goods have recorded surpluses in 2021 (see Figure 8 in the annex). Trading Economics also cites **manufactured copper** as a notable good traded between the EU and Singapore (see Table 1 in the annex). As the shift to carbon neutrality is a main priority in the EU, supplies for copper in building not only green vehicles, but charging stations and infrastructure[10] are crucial.

[10] Exploring future copper demand, recycling, and associated greenhouse gas emissions in the EU-28. (2020). Global Environmental Change. Available under: https://doi.org/10.1016/j.gloenvcha.2020.102093

03

Singapore Development Programmes & Policies: Reimagining Value Chains

EUROPEAN CLUSTER COLLABORATION PLATFORM

Strengthening the European economy through collaboration

3. Singapore Cluster & Industry Programmes: Reimagining Value Chains

Intensifying EU linkages with Singaporean Clusters

Against the backdrop of Singapore's financial excellence, vantage point for trade and cluster programmes, one could state how this presents prospects of intensifying linkages with the EU.

The Lisbon Treaty of 2007 specifically enabled the EU to negotiate investments with third party states, opening novel opportunities for engagement in trade and investment with Singapore[11]. Against the backdrop of other initiatives that spawned EU-Singaporean frameworks in the 21st century, an individual Free Trade Agreement (FTA) mandate specific for Singapore was completed in 2013. This stands out as the key treaty between the EU and Singapore, constituting the EU- Singapore Free Trade Agreement (EUSFTA)[12]. As of November 2019, the agreement has entered force, yielding a range of benefits for businesses such as: eliminating tariffs, reducing trade barriers, and facilitating access to procurement markets.

The aforementioned agreements are evidence of growing trade relations between the EU and Singapore, opening the opportunity for novel projects to build on previous successes. To relate back to the findings of this paper, the EU and Singapore provide an array of goods and services to one another. Plus, Singapore offers an exceptional access point for EU27 businesses to new markets. In a bid to enhance the effective trade relations between the EU and Singapore, one could propose cluster-based projects, given their enabling and facilitating effect on innovation, economic performance, and growth. Regarding clusters, the Industry Transformation Map is the primary Singaporean industrial policy, initiated in 2016, that drives cluster development on the island state.

As of December 2020, Singapore has an agreement on cluster cooperation with the EU, seeking "to build upon the benefits of the EUSFFTA and specifically increase the cooperation between industry clusters in Singapore and the EU"[13]. This agreement is further based on principles of driving a resilient and sustainable economy, especially after the recent shock caused by the COVID-19 pandemic. Given the shared prioritisation in digitalisation, green economy, and resilience between the EU27 and Singapore, it is important to build on networks dealing with knowledge sharing and interlinking diverse industrial ecosystems.

[11] EU-ASEAN trade and investment relations with special focus on Singapore. Singapore Management University. Available at: EU-ASEAN trade and investment relations with special focus on Singapore (archive.org)
[12] European Commission, Memo, EU investment negotiations with China and ASEAN, available at: http://europa.eu/rapid/press-release_MEMO-13-913_en.htm.
[13] EU and Singapore sign cluster cooperation agreement (2020). ECCP News. Available under: EU and Singapore sign cluster cooperation agreement | European Cluster Collaboration Platform

Recent Developments in Cluster and Industry Programmes in Singapore

The case of Singapore showcases a striking example of how industrial policies as well as national cluster policies correspond to development programmes. With the launch of Singapore's first five-year National Technology Plan in 1991, the government began to invest in R&D in a significant and structured manner. Since then, the budget increased for every plan significantly. Under the current trajectory of the **Industry Transformation Programme Industrial Policy (ITP)**, a set of objectives, instruments, and evaluation processes are complemented by aspects and goals directed through the **Research Innovation Enterprise 2025 Plan (RIE2025)**[14].

The different strategies outlined in the plans, have had a consistent focus on supporting ties and concrete partnerships between technology, research, and innovation across private as well as public sectors. The current phase of Singapore's broader economic transformation involves strengthening linkages between complementary industries, in which they are grouped into economic clusters under the **ITP**. The current national cluster policy is also an expression of this approach. Within the previous Research and Innovation Enterprise Plan of 2020, the outlook was to further strengthen cooperation between academia, businesses, and the government. Under RIE2025, the extension of the Cluster Fund is still yet to be announced.

Yet, **as March 2022**, the Singaporean government is reported to have allocated an additional $220 million to the RIE2025 under the Urban Solutions and Sustainability (USS) domain. Hereby a range of initiatives will be supported that focus on safeguarding sustainability, creating resilience to reduce vulnerabilities to supply chain disruptions and improving overall liveability[15][16].

The ***policy objectives*** set the foundation for each of the programmes, with the **ITP** making up the "Broad Policy" of Singapore. The policy generally directs its efforts into developing roadmaps for a total of 23 industries, which are guided by four pillars that lay out the blueprint and key strategies pertaining to the respective industry[17]. These comprise specific objectives, **competitiveness plans and schemes** curtailed to each of the specific industries.

1) ***Productivity*** – strategies to support companies, especially SMEs, to move to higher value-added activities and rase operational efficiency
2) ***Jobs & Skills*** – investing in upskilling and deep skills to Support staff in the shift to greater value creation
3) ***Innovation*** – strategies to leverage R&D to develop new products and services
4) ***Trade and internationalisation*** – supporting companies in expanding to overseas markets.

[14] European Observatory for Clusters and Industrial Change. Cluster programmes in Europe and beyond May 2019. Available at: www.clustercollaboration.eu/sites/default/files/news_attachment/cluster_programmes_in_europe_and_beyond_0.pdf

[15] Pintas (2022): Singapore's $25 billion R&D Budget for the Next Five Years. Singapore's S$25 billion R&D Budget for the Next Five Years | Pintas IP Group (pintas-ip.com)

[16] Patricia Santos (2022): Singapore releases funds for new initiatives in water technologies: Singapore's S$25 billion R&D Budget for the Next Five Years | Pintas IP Group (pintas-ip.com)

[17] Ministry of Trade and Industry 2016. Media Factsheet – Industry Transformation Maps. Integrated Roadmaps to Drive Industry Transformation.
Available at: www.mti.gov.sg/-/media/MTI/ITM/General/Fact-sheet-on-Industry-Transformation-Maps---revised-as-of-31-Mar-17.pdf

Corresponding to the ITP, the plans of the **RIE2025** are coordinated along the following **four strategic domains**:

1. Manufacturing, Trade and Connectivity (MTC)
2. Human Health and Potential (HHP)
3. Urban Solutions and Sustainability (USS)
4. Smart Nation and Digital Economy (SNDE)

These are broadly in line with former RIE plans of 2020[18], however further extend to national-level-needs and the enrichment of science-based policy. Furthermore, it includes the scaling up of platforms to drive technology implementation as well as the strengthening of innovation capabilities in enterprises. On a final note, the **RIE2025** directs its attention to the internationalisation of projects, by promoting and facilitating open innovation partnerships across international ecosystems. This is prioritised to enable enterprises to expand into new markets, whilst aligning themselves with sustainable manufacturing practices.

In the context of implementing said programmes, it is crucial to consider the overarching ***policy focus***, which underpin the respective objectives. For example, the **ITP** programme directs its attention to ITMs and addresses increasingly complex challenges that require cross-cutting solutions from multiple stakeholders. In this sense, strategies are developed to enhance and sustain industries' productivity and innovation level. Parallel to the ITP, **RIE2025** focuses on promoting Science and technology across sectors to meet future challenges and respond to disruptions in the global economy.

Regarding the Funding as well as implementation-side of the programmes, the FEC, operating under the Ministry of Trade and Industry, plays a significant role and is considered the main ***responsible authority***. In parallel, the National Research Foundation (NRF) provides funding for strategic initiatives to build up R&D capabilities. This is complemented by the Research, Innovation and Enterprise Council, which oversees the 5-year long-term strategies[19].

In the context of ***beneficiaries*** of the **ITP**, the ITM seek to address issues within each sector. This is done by deepening partnerships between large enterprises and SMEs, public research institutions, education and training providers, and Trade Associations and ministerial authorities, unions, individuals, and the government. Corresponding to the ITP, the **RIE2025** promotes strong partnerships across businesses, universities, research institutes and the government.

In achieving the ambitions set out in the respective programmes and policies, a variety of ***instruments*** can facilitate the implementation process. In the case of the **ITP,** its roadmap is dependent on a government agency and is overseen by the FEC. Nevertheless, each ITM works within the "Skills Framework" which provides key information on employment

[18] Prime Minister's Office Singapore – National Research Foundation. Research Innovation and Enterprise 2020 PlanWinning the Future through Science and Technology.
Available at: https://www.mti.gov.sg/-/media/MTI/Resources/Publications/Research-Innovation-and-Enterprise-RIE-2020/RIE2020.pdf

[19] Prime Minister's Office Singapore – National Research Foundation. RIE Ecosystem.
Available at: https://www.nrf.gov.sg/about-nrf/rie-ecosystem

tendencies in the specific sector and a list of training programmes for skills upgrading and mastery[20]. The **RIE2025** complements the former, with its budget directed at a diversified portfolio of foundational and applied R&D projects[21], including governmental support for start-ups. The RIE2025 further prioritises hard and soft skills development, whilst the facilitation across local and international ecosystems is considered the key pillar of its strategy.

The overall ***budget*** pertaining to the **ITP** amounts to EUR 2.8 (4.5 SGD) billion, with the financing coming from the Ministry of Trade and Industry. Meanwhile the **RIE2025** budget draws 1% of Singapore's GDP from 2021 to 2025, amounting to ca. EUR 15.5 (25 SGD) billion[22]. Similar to ***EU priorities and policy*** directives, Both **ITP** and **RIE2025** are geared toward the Green Economy, Digitalisation and Social Inclusion in their Policy Prioritisation.

Reimagining supply chains: opportunities within some recent Singaporean initiatives

On a wider South-East-Asian context, Singapore is exemplary of a "springboard" to a region where effective technologies and business models can be scaled up from there. This has implications for supply chains. In the context of reimagining supply chains, there are several recent initiatives of interest in Singapore.[23]

- ***Investment initiatives to reinvent the maritime industry in Singapore for improved supply chains and manufacturing:*** Singapore has initiated large scale investment in port infrastructure and terminal development, especially in the new Tuas port. This features investments in state-of-the-art technology such as automated drones and big-data analytics to carry out operations and boost productivity of the tight labour market[24].
- ***Stimulating the emergence of new technologies:*** Singapore is a global leader in the adoption of emerging technologies, including IoT, AI, blockchain in manufacturing, warehousing and logistics. There are numerous flagship initiatives supported by the Singaporean government, including the "TradeTrust" project - blockchain-enabled bill of lading. This project supports the use of blockchain enabled bill of lading to strengthen Singapore's position as a global maritime hub. It is expected that the electronic documentation in conjunction with blockchain will

[20] Singapore's Professional Services Industry to lead globally in high-value, specialist services
Available at: www.mti.gov.sg/-/media/MTI/ITM/Modern-Services/Professional-Services/Professional-Services-ITM---Press-Release.pdf

[21] The Global Innovation Index 2016. Winning with Global Innovation. Chapter 10: From Research to Innovation to Enterprise: The Case of Singapore by Lim Chuan Poh, Agency for Science, Technology and Research (A*STAR).
Available at: https://www.wipo.int/edocs/pubdocs/en/wipo_pub_gii_2016.pdf

[22] Prime Minister's Office Singapore – National Research Foundation. Research Innovation and Enterprise 2025 Plan.
Available at: https://www.nrf.gov.sg/docs/default-source/default-document-library/rie_booklet_fa2021_pages.pdf

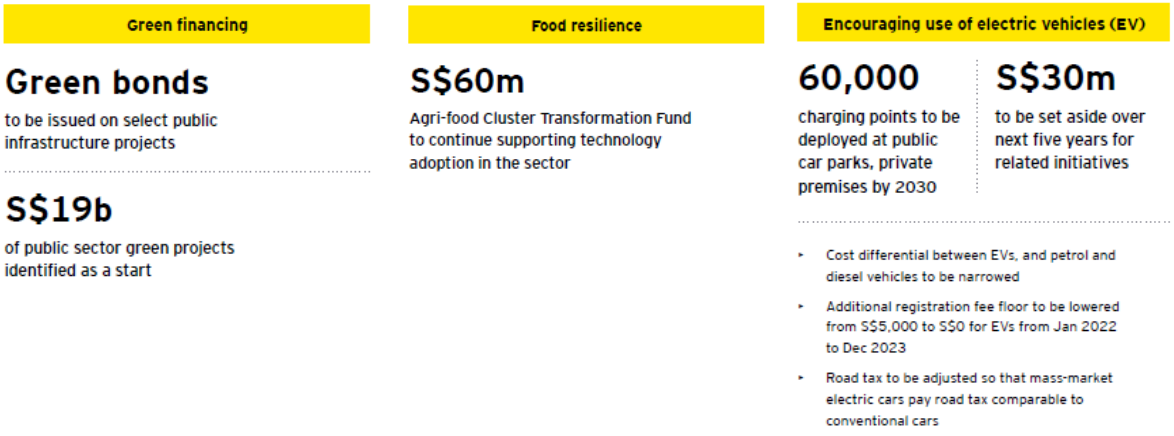
[23] Reimagining manufacturing and supply chains; Investing in Southeast Asia. Singapore Economic Development Board (EDB). Available at: Reimagining Manufacturing and Supply Chains: Investing in Southeast Asia (edb.gov.sg)

[24] Other states in SEA have embarked on similar journeys. Vietnam has developed a seaport master plan for 2021-30 with the aims of enhancing infrastructure connectivity, reducing logistics costs and promoting marine economic development.
In Malaysia, the Industry4WRD National Policy on Industry 4.0 was launched to increase adoption of digital technologies in the manufacturing and related services sectors. The Government has allocated MYR210m to focus on labour productivity growth, manufacturing contribution to the economy, innovation capacity and creation of highly skilled jobs in this sector.

lower bureaucratic costs, help reduce fraud and cut processing times which, in turn, reduces the cost of trade finance. Other private sector initiatives include projects on automated warehousing and picking with expertise from Singapore's precision engineering sector (e.g., PBA group using the patent pending Golden Retriever Automated Robot or SESTO Robotics, a Singapore-based start-up, for semiconductor manufacturing).

- ***Development of a regional sharing economy:*** Jointly, Singapore is promoting peer-to-peer platforms through new legislation. A notable example on sharing economy models in Singapore is Rent Tycoons, an online marketplace for all rentals.
- ***Reimagining green manufacturing and sustainable supply chains:*** with the Singapore Green Plan 2030, the government of Singapore has laid out an important roadmap for green and sustainable investment in the country. Amongst others, the government is issuing green bonds on selected public infrastructure projects with approximately S$19b of public sector projects. These projects include Tuas Nexus, the first integrated water and solid waste treatment facility in Singapore, which shall be operational from 2025. Moreover, to improve food resilience, the so-called "agri-food cluster transformation fund" with S$60m is to support the technology adoption in the food industry. Finally, the Green Plan also includes measures in encouraging the use of electric vehicles by supporting infrastructure development.

Figure 7: Key pillars of the Singapore Green Plan 2030



Source: Reimagining manufacturing and supply chains; Investing in Southeast Asia. Singapore Economic Development Board (EDB). Available at: Reimagining Manufacturing and Supply Chains: Investing in Southeast Asia (edb.gov.sg)

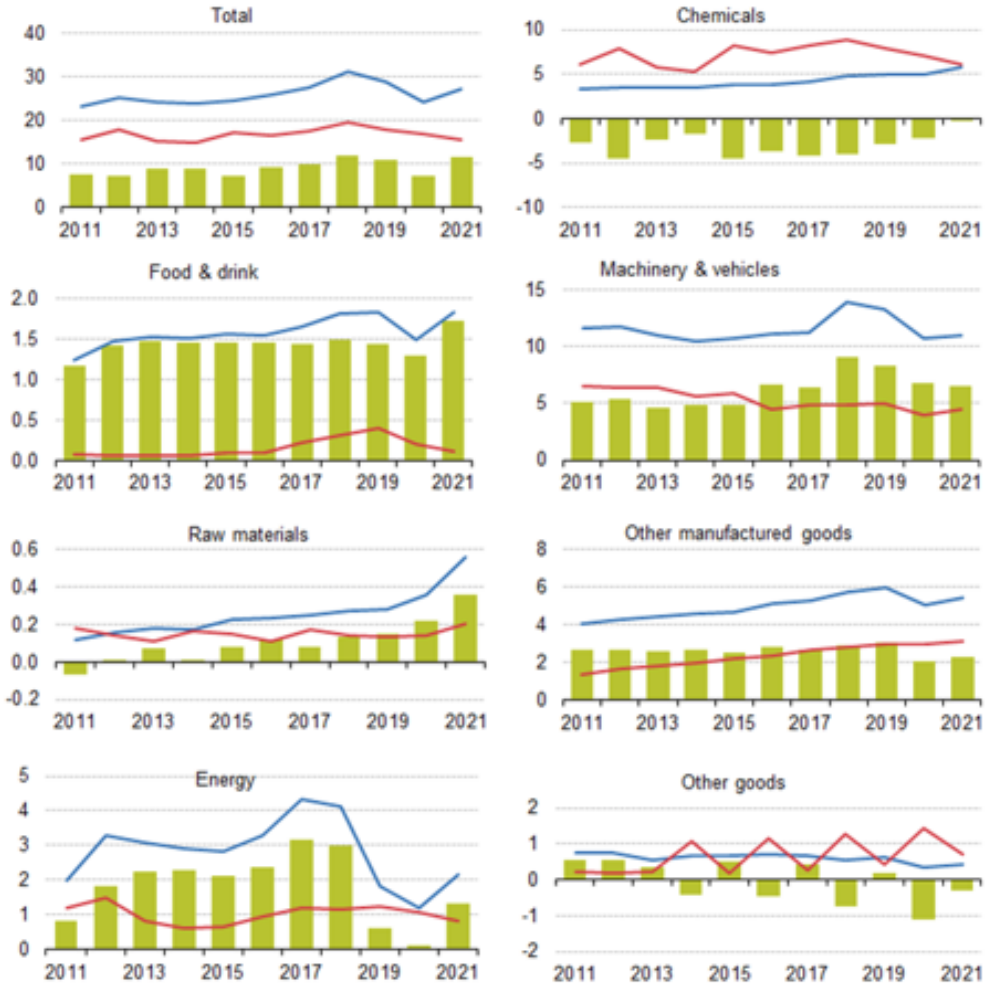
Finally, another recent initiative of interest is the "**Singapore+ Model"**, in which a gateway for manufacturing was created through the Southeast Asia Manufacturing Alliance (SMA). In a partnership of the EDB, Enterprise Singapore (ESG), and private sector partners, the SMA connects businesses with a network of trusted partners to navigate and grow in the diverse markets of the SEA region. The main idea is to combine the synergistic advantages of dual locations in the SEA region with the "SG + 1" twinning model, which allows tapping into Singapore as a global business hub with cost-competitive manufacturing location in short flight distance. This shall help manufactures in building more resilient and efficient supply chains by leveraging complementary advantages.

The capacity and efficiency of Singapore's trade management has grown considerably in the 21st century. Next to high levels of productivity and exploiting the unique vantage point in the Southeast Asian region, Singapore has become an attractive trading partner to many in the world, especially the EU. Nevertheless, disruptions in trade and supply chains have proven to have a negative impact on the production capacity of firms, creating pressures and impacting wages[25]. In a bid to addressing its strong dependence on trade, Singapore has launched multiple policies and programmes in a bid to make their economy more green, circular, and resilient.

[25] European Commission (2022): Detecting and Analysing Supply Chain Disruptions. Available online https://ec.europa.eu/docsroom/documents/49114 (last accessed 21.03.2022)

Annex

Figure 8: EU trade with Singapore by group, 2011-2021 (€ billion)



Source: Eurostat & Comext (2022)

Table 1: EU exports of copper to Singapore

Types of Copper	Year	Value
Copper plates, sheets and strip, over 0.15mm thick	2021	$184.83M
Copper Foil of Thickness No Exceeding 0.15mm	2021	$19.26M
Refined copper and alloys (no mast allow), unwrought	2021	$12.69M
Articles of copper not specified elsewhere	2021	$6.71M
Copper tube or pipe fittings	2021	$5.85M
Copper wire	2021	$2.82M
Copper bards, rods and profiles	2021	$2.27M
Nails, Tacks, Staples, Screws, Bolts, Nuts, of Copper	2021	$1.88M
Copper tubes and pipes	2021	$1.55M
Copper waste and scrap	2021	$1.08M
Household Articles, Pot Scourers, Sanitary Ware, of Copper	2021	$822.78K
Copper powders and flakes	2021	$352.67K
Master allows of copper	2021	$260.01K
Stranded Wire, Cables, Plaited Bands and the Like, of Copper	2021	$192.62K
Unrefined copper, copper anodes for electrolytic	2021	$109.52K
Copper mattes, cement copper (precipitated copper)	2019	$59.69K

Source: Trading Economics (2022), based on UN Comtrade Database

Bibliography

Bibliography

Country Factsheet: Singapore (2021). European Cluster Collaboration Platform. Available at: eccp-factsheet-singapore.pdf (clustercollaboration.eu)

CFI – Corporate Finance Institute (2022). What is the Balance of Trade (BOT)? Available under: Balance of Trade - Definition, Formula, and Example (corporatefinanceinstitute.com)

European Observatory for Clusters and Industrial Change. Cluster programmes in Europe and beyond May 2019. Available at: www.clustercollaboration.eu/sites/default/files/news_attachment/cluster_programmes_in_europe_and_beyond_0.pdf

Ministry of Trade and Industry 2016. Media Factsheet – Industry Transformation Maps. Integrated Roadmaps to Drive Industry Transformation. Available at: www.mti.gov.sg/-/media/MTI/ITM/General/Fact-sheet-on-Industry-Transformation-Maps---revised-as-of-31-Mar-17.pdf

Prime Minister's Office Singapore – National Research Foundation. RIE Ecosystem. Available at: https://www.nrf.gov.sg/about-nrf/rie-ecosystem

Prime Minister's Office Singapore – National Research Foundation. Research Innovation and Enterprise 2020 PlanWinning the Future through Science and Technology. Available at: https://www.mti.gov.sg/-/media/MTI/Resources/Publications/Research-Innovation-and-Enterprise-RIE-2020/RIE2020.pdf

Prime Minister's Office Singapore – National Research Foundation. Research Innovation and Enterprise 2025 Plan. Available at: https://www.nrf.gov.sg/docs/default-source/default-document-library/rie_booklet_fa2021_pages.pdf

Reimagining manufacturing and supply chains; Investing in Southeast Asia. Singapore Economic Development Board (EDB). Available at: Reimagining Manufacturing and Supply Chains: Investing in Southeast Asia (edb.gov.sg)

Singaporean-German Chamber of Industry and Commerce, May 2021: Länderprofil Singapur – Allgemeine Standortinformationen. Available at: 3476_Laenderprofil_Singapur-Allgemeine-Standortinformationen-2021.pdf (hessen-agentur.de)

Singapore's Professional Services Industry to lead globally in high-value, specialist services Available at: www.mti.gov.sg/-/media/MTI/ITM/Modern-Services/Professional-Services/Professional-Services-ITM---Press-Release.pdf

The Global Innovation Index 2016. Winning with Global Innovation. Chapter 10: From Research to Innovation to Enterprise: The Case of Singapore by Lim Chuan Poh, Agency for Science, Technology and Research (A*STAR). Available at: https://www.wipo.int/edocs/pubdocs/en/wipo_pub_gii_2016.pdf