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INDUSTRY HORIZON

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Krungsri Research



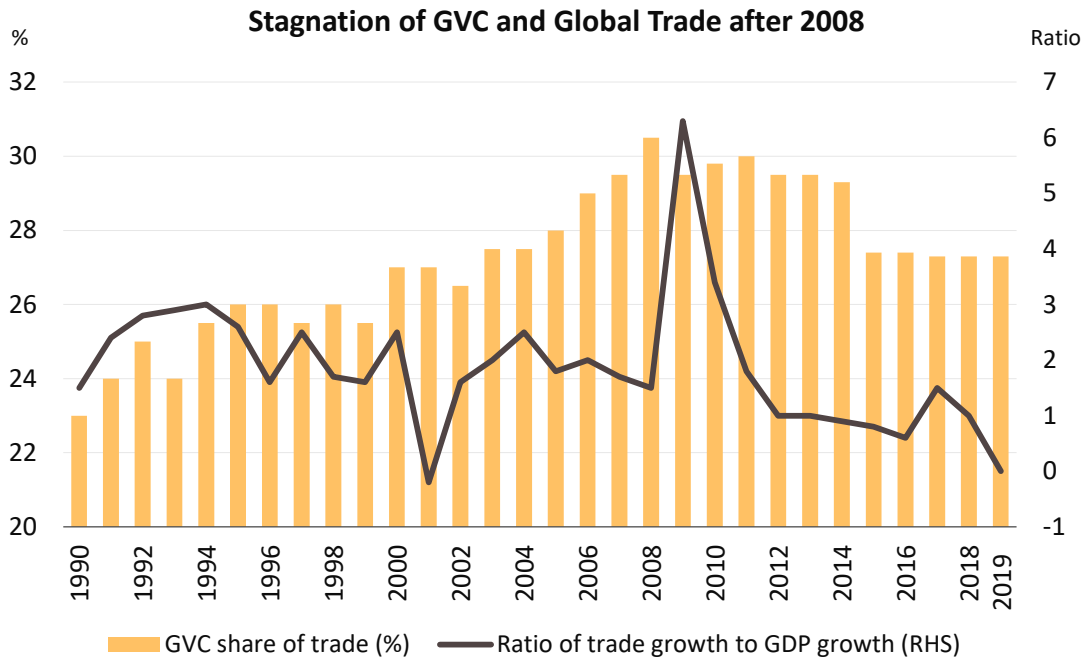
01 INDUSTIAL STRATEGY

02 2021-2023 OUTLOOK

Thailand's Industrial Strategy in the Midst of Global Value Chain Transformation

- Global value chains (GVCs) and trade have stagnated for the past 10 years under the twin impacts of reshoring in the major economies and increasing trends to regionalization. Looking forward, competition has worsened. These force countries that are not prominent manufacturers (including Thailand) to raise their competitiveness if they want to stay in the GVC.
- Understanding Thai competitiveness in the global venue and how this is shaped would help industries enhancing their competitiveness. Thus, Krungsri Research has constructed the Sectoral Potential Index (SPI), which reflects the ability of players within an industry to supply goods and services that satisfy global demand, and it could generate profits for the country.
- The results show that, **Thai industrial potential ranked 35th out of the 64 countries and 2nd among ASEAN**. with the country's strongest industries. Although Thailand has well participated in the world markets, they are not able to add value to the extent that might be expected. It results in diminishing capital accumulation, which will limit the future growth potential of both sectors and Thai economy.
  - Over the next 5 years, industries where Thailand will see an improving outlook and greater potential are generally in services, including recreation, telecommunications, accommodation, healthcare, and transportation, all of which will benefit from high levels of labor productivity and the entrepreneurial skills of existing players. On the other hand, sectors where Thailand's potential will likely decline are concentrated in high-tech manufacturing, such as computer and electronics, motor vehicles, chemical products and electrical equipment, because although these are important export industries, Thailand is generally in a mid-stream position in these supply chains, and this restricts manufacturers' ability to add value.
  - Although Thailand is in a better position than its neighbors with regard to advanced manufacturing and services, this gap will narrow as other countries in the region carry out ambitious development plans. In light of this, Thailand should seize the opportunity to develop GVCs that cement stronger trade links with other countries, and through this build value and secure the country's position within supply chains.
- Our study has also revealed **factors shaping sectoral potential include supply chain structure, technology, transportation infrastructure, ease of doing business, market size, capital, and access to inputs.** The supply chain structure (refers to the position, participation and a length of supply chain) is most important factors, which accounts for 30.7% of sectoral potential. These factors would help to suggest strategies for enhancing sectoral potential that can be divided in two broad approaches: (1) internal development and (2) partnership with external players.
- **According to industry's ability and influenced factors for each sector's potential, Krungsri Research recommend strategies to develop Thailand's sectoral potential** including internal development (developing new products, accessing to raw materials), partnership (seeking for technology, and moving along the GVC), government supports (easing regulations, investing in infrastructure), depending on how the potential of each may best be improved.

Global perspective: The decline in GVCs and global trade is increasing competitive pressures and forcing industries to look for more secure positions on the world stage



Note: GVC share of trade is proxied by the share of foreign value added in exports, based on the UNCTAD-Eora GVC database 2019

Intensity of Backward Linkages in the World



Intensity of Forward Linkages in the World



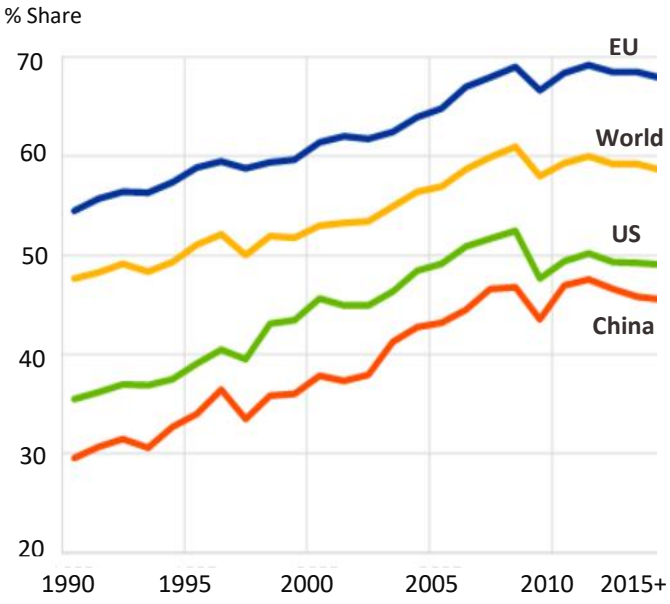
Note: Darker greens reflect higher values of GVC measures

- **Global value chains (GVCs) and trade have stagnated over the past 10 years,** as shown in the post-2008 decline in the GVC share of trade and the weakening ratio of trade growth to GDP growth. This changing dynamic is a consequence of lower global growth in investment and in the world economy that can be traced back to the moves by the major economies to reverse trends to globalization, the latter including China's increasing reliance on domestic manufacturing, Europe's greater emphasis on intra-regional trade, and the erection of significant barriers to trade by the US. As a result of these changes, competition has worsened on world markets.
- Against a backdrop of narrowing global trade channels, the majority of countries that are still able to add value typically have a high intensity of backward and forward linkages within GVCs, and these are generally in East Asia, Europe and North America (World Bank, 2020). However, countries that lack a prominent upstream or downstream position in supply chains will need to improve their competitiveness as they look to secure a long-term position within GVCs.

Source: World Bank, UNCTAD , WTO 2020, IMF working paper 2019, Krungsri Research.

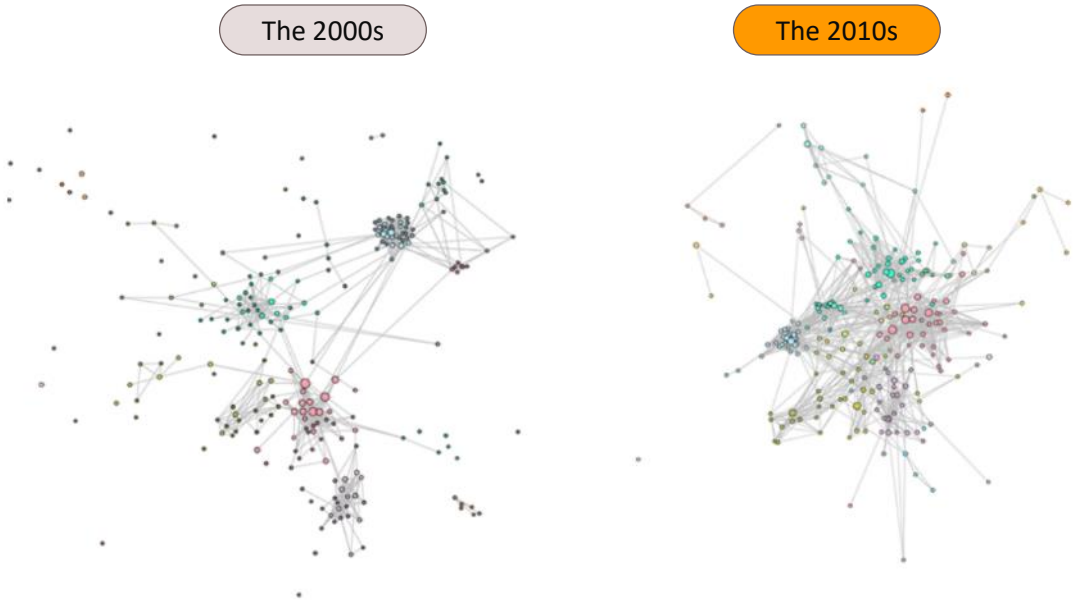
Major economies are increasingly turning to regionalization, and this is shortening global value chains

Global value chain participation of major countries



Note: GVC participation is the sum of upstream and downstream participation, as share of the country/region total exports

A Decade of Shorting Global Value Chain Network

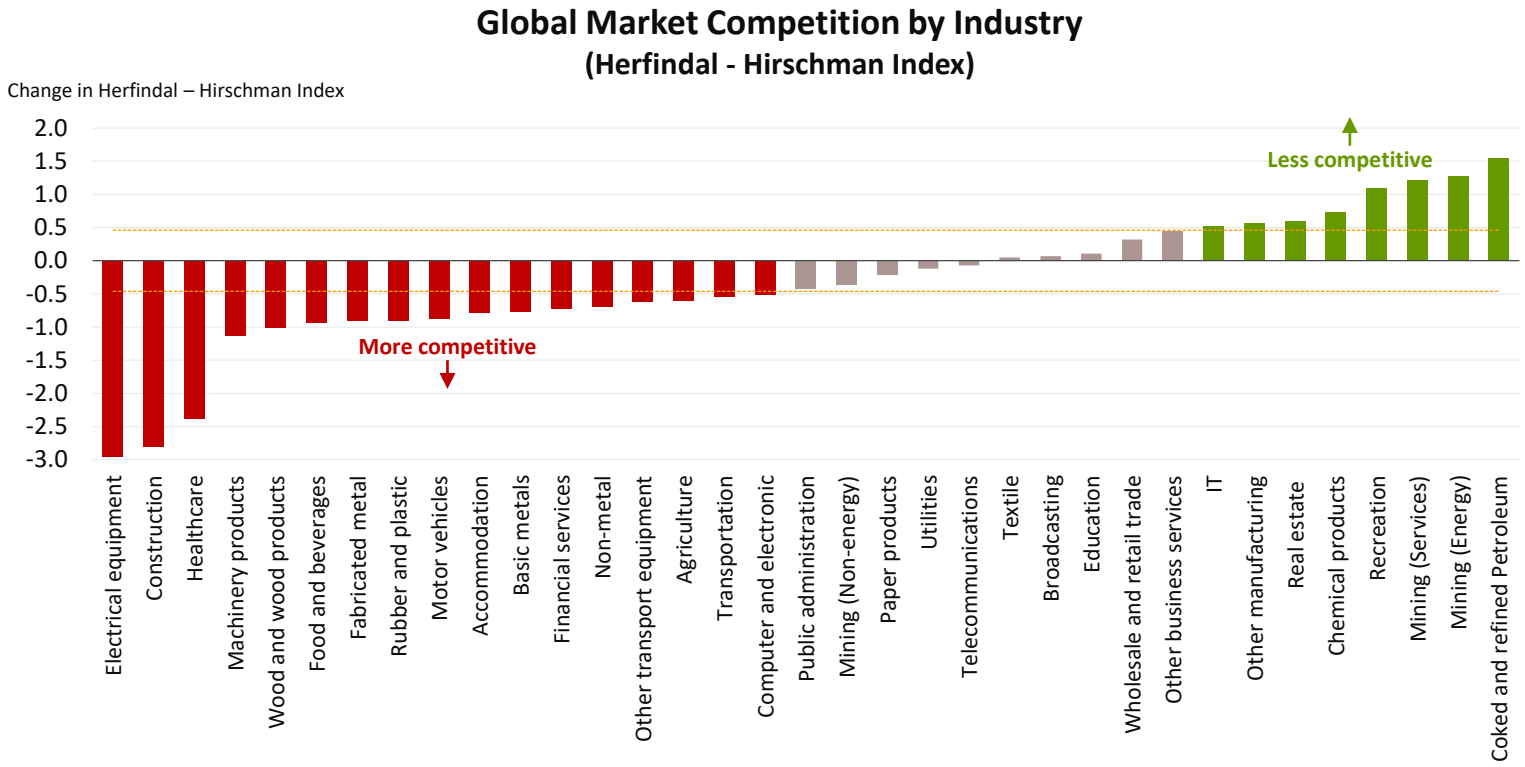


Note: Gray lines (edges) connecting the dots represent trade flows in intermediate inputs between sectors.

- **The major economic powers have been cutting their participation in GVCs as trends to regionalization increase.** Rising levels of protectionism and rapid technological advances are also contributing to these shifts, in the latter case because this allows advanced economies to move from a reliance on labor costs (as in the past) to instead becoming more self-reliant through the development of upstream technology. Countries that are excluded from this process will need to respond to the changing business environment and secure their position in GVCs by overhauling their operations.

Source: Rising protectionism and global value chains, Working paper series January 2020, European Central Bank, Krungsri Research

Developing the national industrial potential of the different countries that participate in GVCs is feeding into a rise in competitive pressures



- Ratcheting up industrial potential in both the developed economies, which are competitive in the development of new technologies, and the newly industrialized/developing economies, which are increasing the efficiency and productivity of their manufacturing processes, is happening inside world markets that are saddled with rising trade barriers, and this is then feeding into higher levels of competition on a global scale.
- Krungsri Research believes that over the next 5 years, 17 industries will see rising levels of competition, for example electronics goods, construction, and healthcare, while competition will weaken in 8, including petrochemicals, energy extraction, and mining services, as per an analysis using the Herfindal-Hirschman Index.

Source: OECD, calculation by Krungsri Research

On the world stage, the potential of Thai industry came 35th out of the 64 countries and 2nd among ASEAN

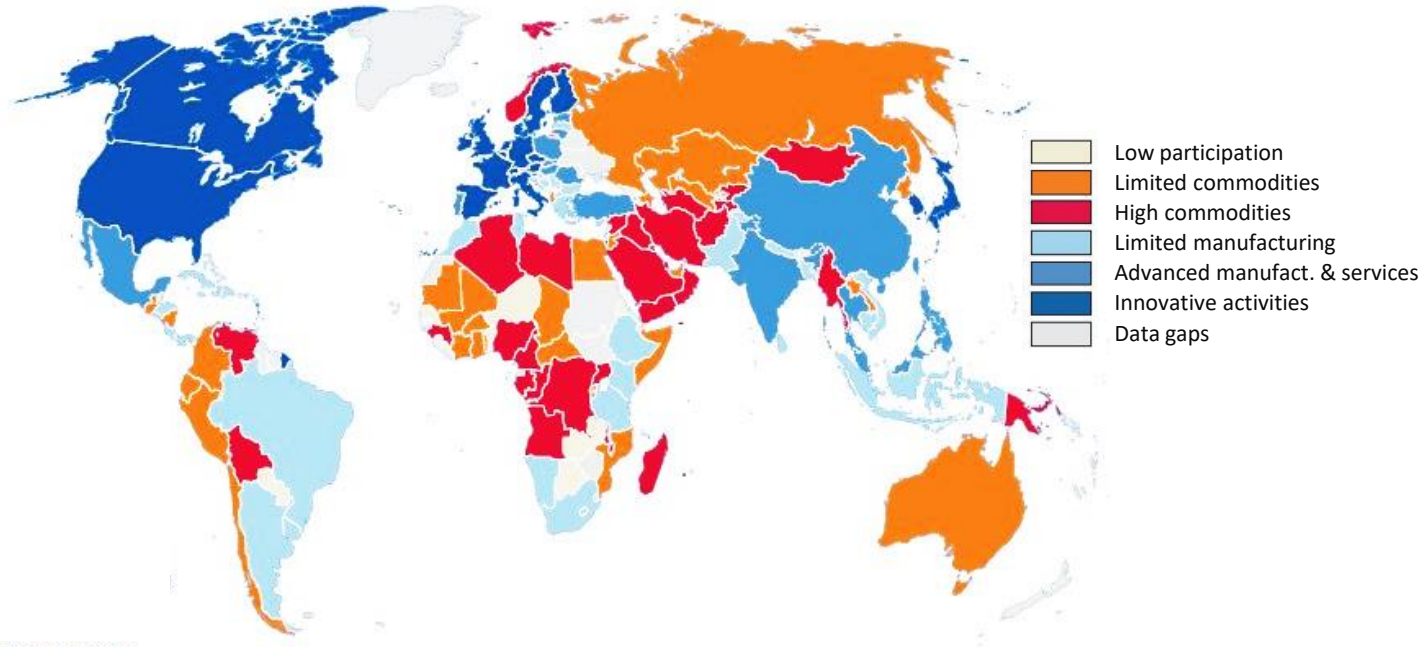
Industry Potential Ranking by Country

1	United States	17	Taiwan	33	Sweden	49	Lithuania
2	China	18	India	34	Greece	50	Morocco
3	Germany	19	Netherlands	35	Thailand	51	Portugal
4	United Kingdom	20	Korea	36	Indonesia	52	Tunisia
5	Japan	21	Brazil	37	Peru	53	Czech Republic
6	France	22	Singapore	38	Philippines	54	Croatia
7	Italy	23	Argentina	39	Hong Kong	55	Romania
8	Saudi Arabia	24	Poland	40	Colombia	56	Hungary
9	Russian Federation	25	Finland	41	Malaysia	57	Slovak Republic
10	Spain	26	Belgium	42	Kazakhstan	58	Slovenia
11	Switzerland	27	Israel	43	Costa Rica	59	Latvia
12	Canada	28	Denmark	44	Brunei Darussalam	60	Cyprus
13	Ireland	29	Norway	45	Luxembourg	61	Bulgaria
14	Mexico	30	Chile	46	Vietnam	62	Iceland
15	Australia	31	Austria	47	South Africa	63	Estonia
16	Turkey	32	New Zealand	48	Cambodia	64	Malta

Source: Krungsri Research, The research based on competitiveness measurement and sectoral potential index (SPI), 'Thai Industry: How Competitive is Thailand on the World Stage?' Research intelligence

Thai industry might benefit from countries' differences of GVC participation. This leads to partnership strategy which helps enhancing potential

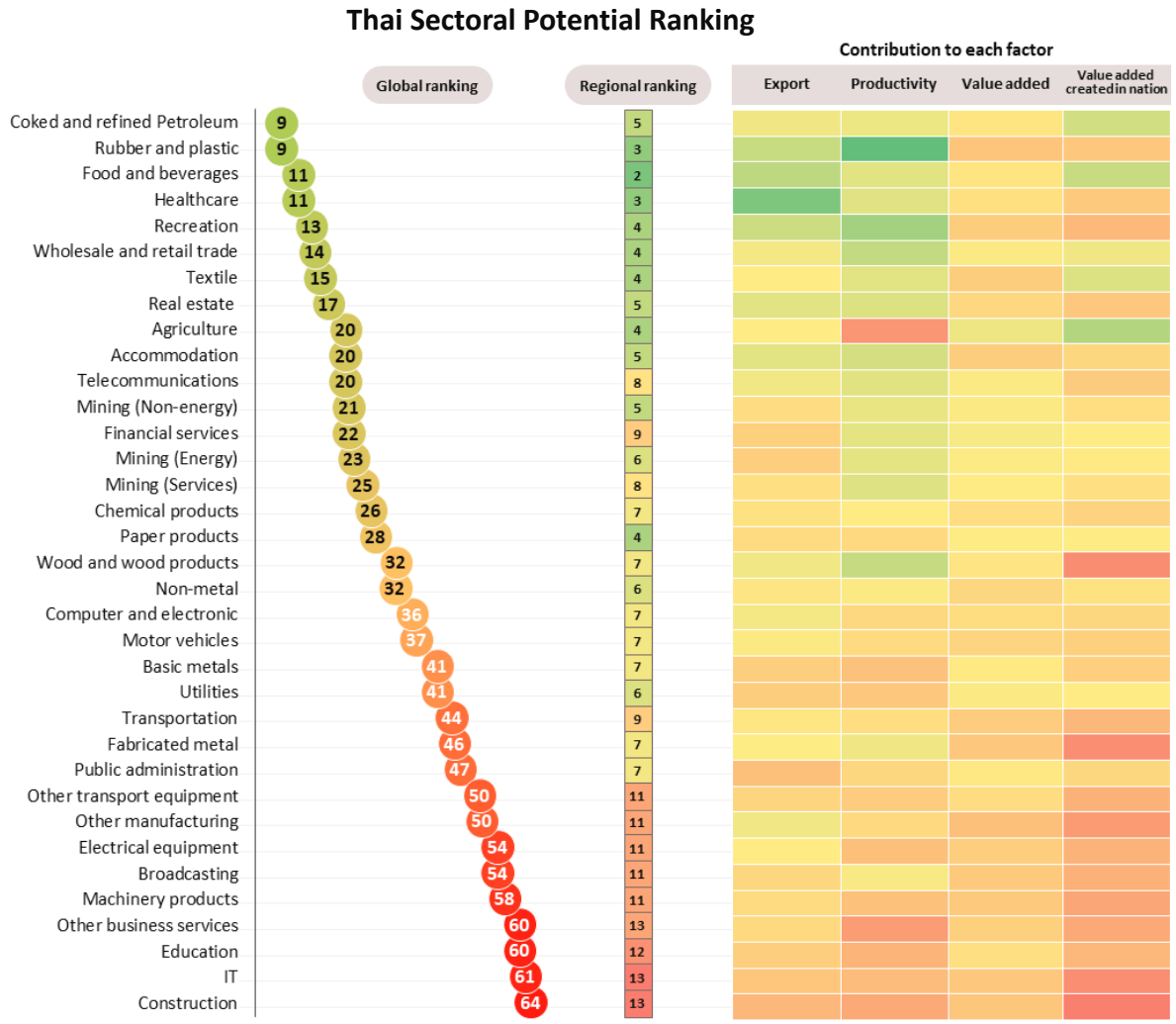
Countries Participating in GVCS in Different Ways



- **All countries participate in GVCs but they do so in different ways.** The developed and large emerging countries participate in complex GVCs producing advanced and innovative manufactures and services. By contrast, many countries in Central Asia, Latin America and Africa still produce commodities for further processing in other countries or engage in limited manufacturing (World Bank,2020).
- In the case of Thailand, although the country is involved in advanced manufacturing and services, its industrial potential is greater than that of neighboring countries, nations across the region have ambitious development plans for the next 5 years (e.g., for high-tech industries in Vietnam, for the manufacture of modern machinery in Malaysia, for advanced education in Indonesia, and for agriculture development in Cambodia) and this will undermine Thailand's relative advantage.
- Thailand should build stronger trade connections with other countries to advantage of the variety of GVC linkages on offer. This could involve: expanding involvement with innovative activities (the majority of which have high levels of industrial potential) that help to build greater added value; connecting to neighboring countries that have access to high levels of commodities to increase the potential of supply chains; and linking to countries that have limited manufacturing capacity to build greater trade opportunities.

Source: World Bank 2020, Krungsri Research

Thai industry potential: Industries where Thailand shows high levels of potential are those where the sector has access to significant export markets



- Thailand's 7 industries are ranked in the top 15 globally*. These are: coke and refined petroleum, rubber and plastics, food and beverages, healthcare, recreation, wholesale and retail trade, and textiles.
- It is notable that industries in which Thailand shows high potential are largely also those where the country benefits from high levels of manufacturing productivity and access to significant export markets. By contrast, sectors where Thailand is weakest are also those where players are most reliant on the domestic market and where opportunities to add value are limited. Therefore, connecting to global supply chains could expand the opportunities available to players looking to develop industrial efficiency.

Note: *Calculated from an assessment of productivity, export share to world exports, and value-added

Source: OECD, calculation by Krungsri Research

Note: Regional ranking includes Brunei Darussalam, Cambodia, Indonesia, Philippines, Singapore, Thailand, Vietnam, Japan, Korea, India, Hong Kong, Malaysia, and Taiwan

Over the next 5 years, the Thai service sector is expected to show greater potential, while in high-tech manufacturing, potential will weaken

Future Trend of Thai Industry

Industries with higher ranking

- Recreation
- Telecommunications
- Utilities
- Accommodation
- Wood and wood products
- Transportation
- Healthcare
- Paper products
- Machinery products
- Broadcasting
- Real estate
- Education
- Basic metals
- Fabricated metal
- Agriculture
- Mining (Non-energy)
- Wholesale and retail
- Financial services
- Public administrator

Industries with unchanged ranking

- Mining (Services)
- Coked and Petroleum
- Rubber and plastic
- Non-metal
- Computer and electronic
- Motor vehicles
- Construction
- Other business services

Industries with lower ranking

- Chemical products
- Electrical equipment
- Other transport equipment
- Other manufacturing
- Mining (Energy)
- IT
- Food and beverages
- Textile

- Krungsri Research's assessment of Thai industrial potential over the next 5 years shows that in 19 sectors, (mostly in services) should increase, these including recreation, telecommunications, accommodation, healthcare, and transportation. These sectors will benefit from labor productivity and the potential of existing business owners.
- Industrial potential will stay unchanged or worsen in 16 sectors, most of which are in manufacturing and especially in areas that require the use of high-tech manufacturing processes, such as the manufacturer of computers and electronics, auto assembly, chemical products, and electrical equipment. Although these are important export industries for Thailand, in most, the country is able to generate only low levels of added value. Base on future trend, the proper ways of development will help improve the potential of industries especially those with lower ranking.

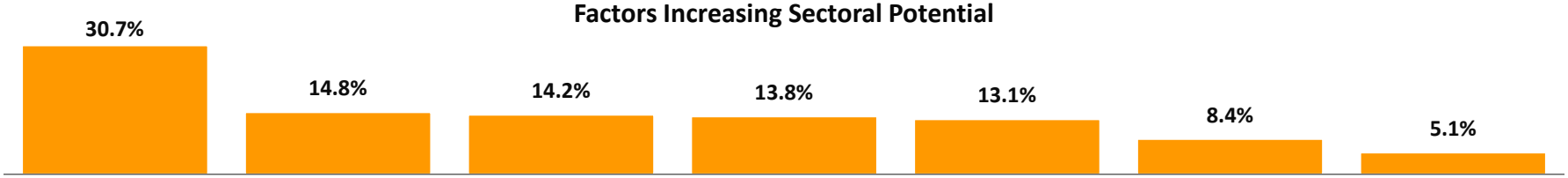
Source: Office of the National Economic and Social Development Council (NESDC), Krungsri Research

Supply chain structure, technology and transportation infrastructure are most important factors shaping industrial potential

To help better target measures aimed at developing industrial potential**, Krungsri Research has carried out an econometric analysis of the factors that contribute to the industrial potential. This shows that there are seven factors including supply chain structure, technology, transportation infrastructure, ease of doing business, market size, capital, and access to inputs.** The first three of these account for respectively 30.7%, 14.8% and 14.2% of sectoral potential.

Sectoral potential index (SPI)

Factors Increasing Sectoral Potential



Supply chains	Technology	Infrastructure	Ease of doing business	Markets	Capital	Raw materials
Position: most sectors' potential improves if the industry is moving toward either downstream or upstream. **Participation:** This helps primary manufacturing and resource-intensive production (rubber, chemical, metal)	**Technology, innovation level, and R&D expenses** increase potential of all sectors, particularly hi-tech manufacturing **Supply chain length:** Shorter supply chain would boost potential for all sectors except motor vehicle and chemical industry.	• **Air:** transportation, accommodation, and recreation • **Water:** primary manufacturers • **Rail:** Most sectors. Especially primary manufacturing and services	**Ease of doing business:** more complicated and comprehensive service industries, especially for financial services and healthcare	**GDP per capita and Population**: Income-sensitive sectors, especially healthcare, real estate, education, transportation, construction, and accommodation	Capital factors include both **accessibility and costs of funding**. These factors are important for accommodation, retail, and construction.	**Access to raw materials and inputs**: increasing access to inputs has the greatest impact on potential for resource-intensive industries such as mining and the extraction of energy resources

Source: OECD, calculation by Krungsri Research

Changing the position in the GVC is an important strategy for improving competitiveness and increasing the amount of value added to industrial processes

Industry That Requires Moving along the Global Supply Chain

Moving Upstream

1. Agriculture, forestry and fishing
2. Food products, beverages and tobacco
3. Coke and refined petroleum products
4. Chemicals and pharmaceutical products
5. Basic metals
6. Computer, electronic and optical products
7. Motor vehicles, trailers and semi-trailers
8. Other transport equipment
9. Other manufacturing
10. Accommodation and food services
11. Real estate activities
12. Other business sector services

Moving Downstream

1. Mining and extraction of energy producing
2. Mining and quarrying of non-energy producing
3. Mining support service activities
4. Wood and products of wood and cork
5. Paper products and printing
6. Rubber and plastic products
7. Other non-metallic mineral products
8. Fabricated metal products
9. Electrical equipment
10. Machinery and equipment
11. Electricity, gas, water supply, sewerage, waste and remediation services
12. Construction
13. Transportation and storage
14. Publishing, audiovisual and broadcasting activities
15. Telecommunications
16. IT and other information services
17. Public admin and defense
18. Education
19. Human health and social work
20. Arts, entertainment, recreation and other service activities

- Analysis by Krungsri Research shows that the most important factor in determining industrial competitiveness is where that industry sits within supply chains and, if necessary, relocating to more advantageous positions. This is because many Thai industries are involved in midstream processes, which typically generate only low levels of added value, and shifting either further upstream or downstream would allow companies to generate greater levels of added value (as per the Smiling Curve Theory).
- Out of the 35 sectors, 32 would see an improvement in competitiveness if they shifted their position within supply chains. Important industrial sectors in Thailand that would benefit from moving upstream include petrochemicals, computer, and automobile sectors, while those would benefit from moving downstream include electronics, utilities and plant and machinery.

Source: OECD, calculation by Krungsri Research

Strategy priority recommendation for developing Thailand's sectoral potential

- **Given the results of both Thai industry potential and the factors that help to determine this potential, Krungsri Research is now possible to divide Thai industry into 8 groups, according to how the potential of each may best be improved.**
- For example, for rubber industry, they are already highly competitive but would benefit from shifting their position toward more downstream in the GVC. So, new investment by their own players to find the sweet spot in manufacturing or their product champion would be very good choices. Meanwhile, motor vehicle sector might need a partner who is excel in upstream to help the sector shifting toward better positions in the GVC. Healthcare business would benefit from partnership with countries with large market size.

Industry group by development suggestion

Internal development

High competitiveness; new products
Coked and refined Petroleum
Rubber and plastic

Access to raw materials
Mining (Energy)
Food and beverages

Both internal development and partnership

Seek for technology and improve productivity
Agriculture
Paper products

Partnership

High competitiveness; New market
Real estate
Healthcare

Seek for new technology
Mining (Non-energy)
Textile
Utilities
Broadcasting
Telecommunications
Education
IT
Construction

Government supports

Easing regulation
Financial services
Public administration

Invest in infrastructure
Wood and wood products
Wholesale and retail trade
Transportation
Recreation
Accommodation

Moving along the global supply chain
Chemical products
Non-metal
Basic metals
Fabricated metal
Computer and electronic
Electrical equipment
Machinery products
Motor vehicles

Source: Krungsri Research

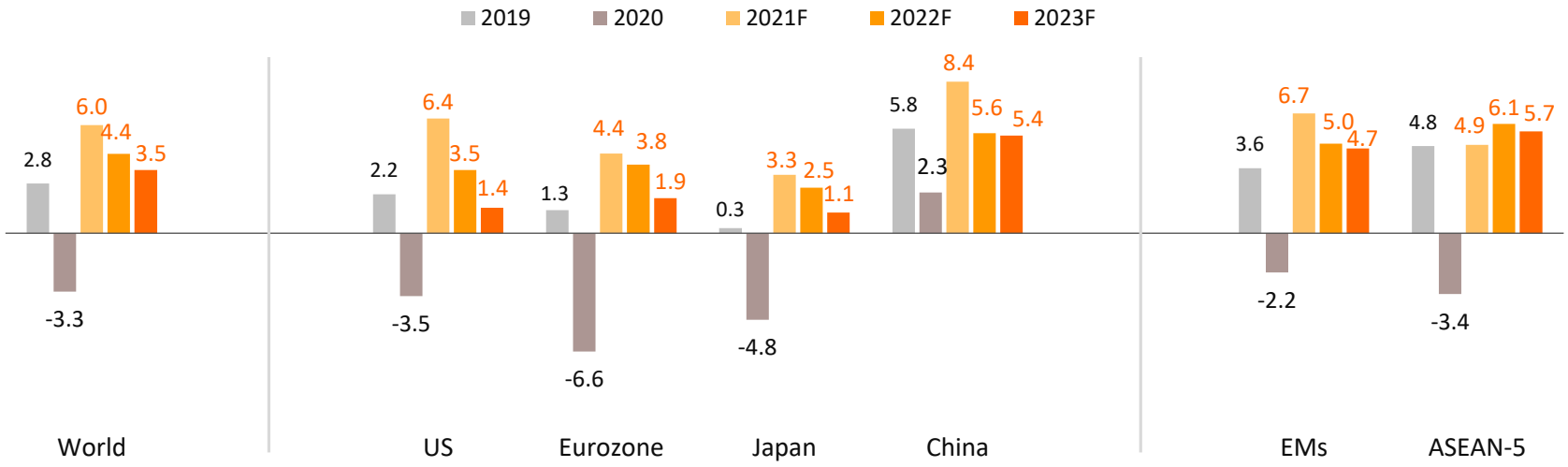


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Macroeconomic environments: The world economy will gradually recover but at a different pace

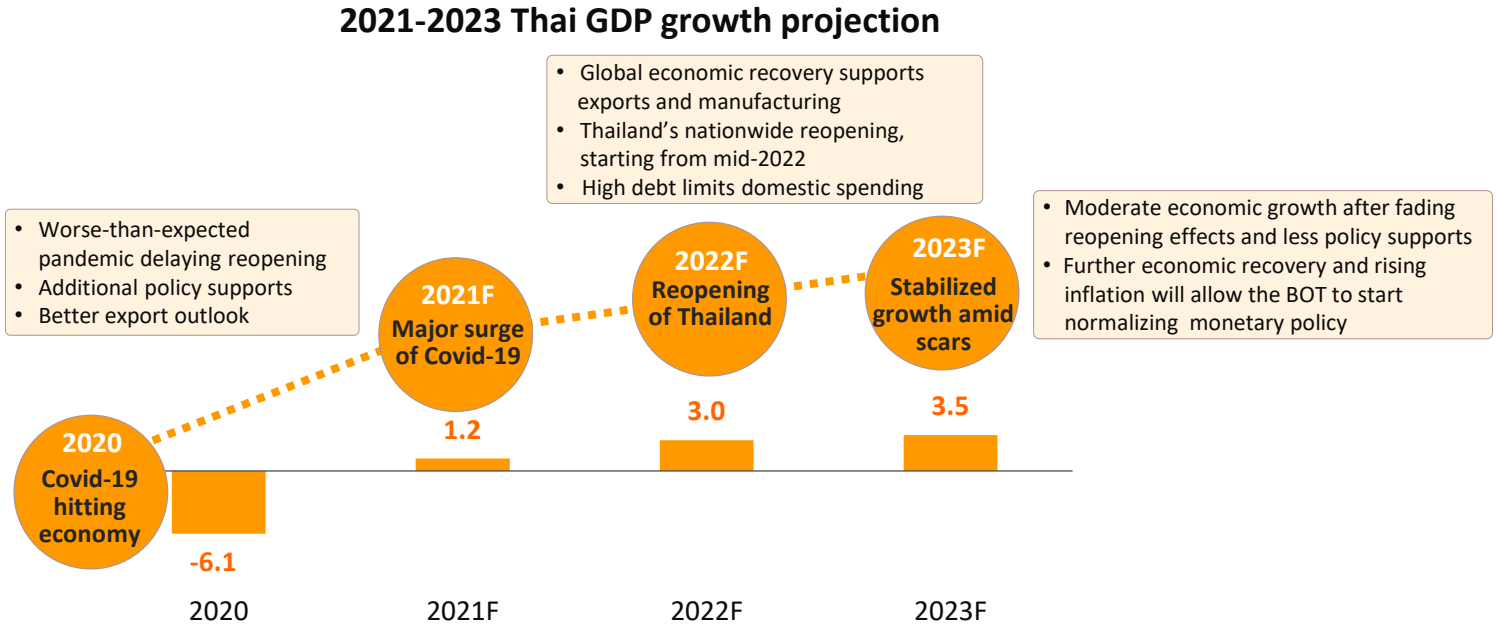
IMF's global GDP growth projection for 2021-2023 (%)



- Global growth will be led by major economies, including the US, Europe and China, thanks to the government's huge packages of economic stimulus measures and the success of their vaccination programs which help growth in manufacturing and services sectors to turn positive.
- Manufacturing supply chains are tending to become shorter, more diversified and more regionalized in the face of increasing barriers to world trade and the moves by major economies to become more self-reliant in the provision of goods to their domestic markets.
- Krungsri Research believes that across the global economy, differential rates of recovery in terms of country and industry will be amplified by: (i) differences in the speed of vaccination rollouts; (ii) variations in the extent to which economies are dependent on tourism, with highly dependent countries (including Thailand) seeing much slower recovery; and (iii) the impact of supply shortages on manufacturing output; such as the shortage of shipping and container space, which could hold back the upside of export growth, and the shortfall in the supply of computer chips, which could limit growth in automobile, electronics and electrical appliance industries.

Source: IMF World Economic Outlook (April 2021), Krungsri Research

Thailand: Overall economic recovery will be delayed amid extreme uncertainty



2021: The major surge of domestic inflections with the Delta variant, delayed vaccination progress and strict containment measures would severely hit domestic activity and delay Thailand's economic recovery even though the export sector is rebounding robustly.

- Exports have been supported by a return to growth in many major export markets and as such, manufacturing output in many sectors and overall domestic investment have exceeded their pre-Covid-19 levels.
- Nonetheless, the latest wave of domestic pandemic, which becomes worse and longer than expected, is delaying the reopening of domestic economic activity, further dragging the services sector and undermining confidence amid limited supports from fiscal and monetary policies.

2022-2023: With a nationwide reopening in mid-2022, the Thai economy could expand stronger but at a gradual pace. Downside risks still remain.

- Given Thailand to start reopening to vaccinated visitors nationwide in mid-2022, this will help to underpin a revival in confidence and domestic economic activity, which will be especially important for the services sector. Private investment will recover on stronger manufacturing for exports, while an expansion in government spending, especially on infrastructure projection, will also boost economic growth.
- However, economic scars from pandemic, such as high debt and unemployment, will curb the upside of this recovery. In addition, downside risks remain given very-high uncertainties about vaccination progress, virus mutation, vaccine efficacy and domestic political issue.

Source: Krungsri Research

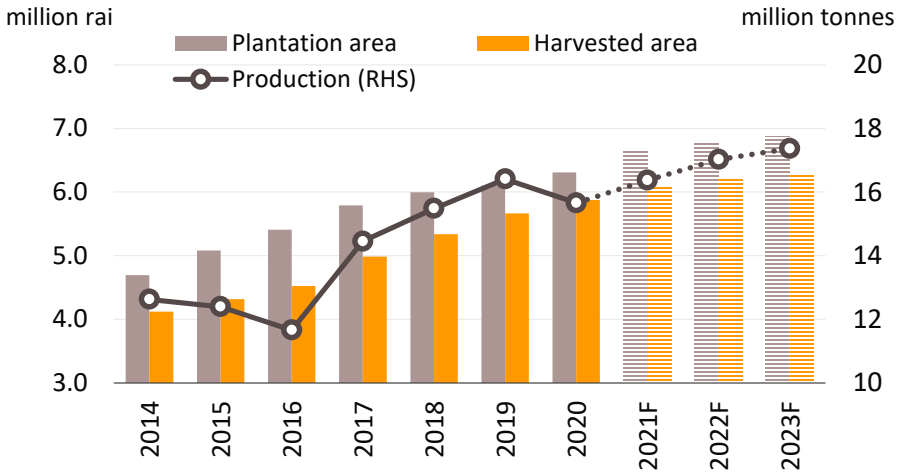
Structural factors affecting Thai business and industry in the period ahead

- The Thai economy is shifting from an emphasis on manufacturing sector to becoming more service-oriented sector. Thus, the contribution of services sector to Thai GDP increased from 55.8% in 2008 to 63.2% in 2019, with tourism, trade, hotels and restaurants which has taken on a great economic importance. In the coming period, the development of new technologies will also push players to develop new business models, for example through the increasing delivery of digital services.
- The development and introduction of modern technology is precipitating a major industry transformation. Over the next 3 years, the most important technologies driving this will be 5G technology, the internet of things (IoT), artificial intelligence (AI) and blockchain technology. The Covid-19 pandemic has served to significantly accelerate it.
- Thai industrial competitiveness will be limited by structural problems that will force the country to yield territory to its competitors. These problems include a lack of investment in research and development, limited innovation with regard to both the development of new products and their adoption, and the absence of comprehensive integrated infrastructure networks.



Oil Palm: Yields are expected to rise steadily, limiting the room for price increases

Thai Oil Palm Plantation Area and Production

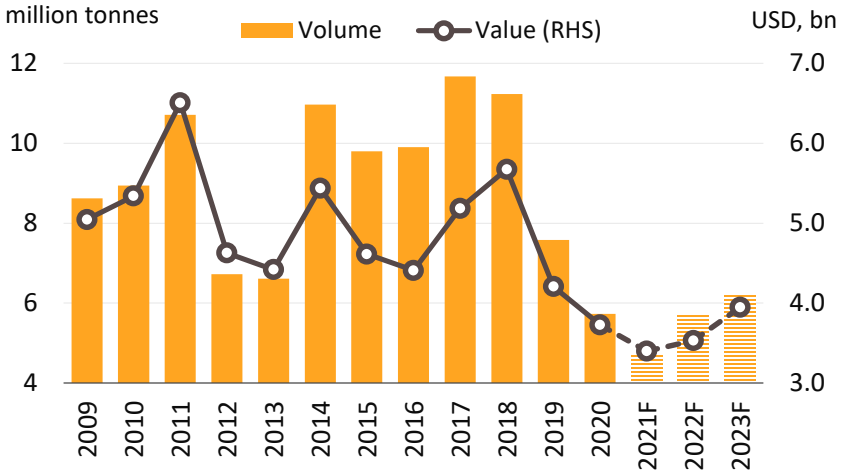


- **In 5M21**, the price for oil palm averaged THB 5.8/kilogram, up 32.3% YoY. This rise was supported by: (i) stronger demand in export markets; (ii) lower supply caused by a fall in domestic yields; and (iii) government moves to clamp down on the illicit cross-border trade in palm oil. In the remainder of the year, the supply of oil palm to the market should improve, and as such, **for 2021 overall, average prices for oil palm will be THB 5.4-5.6/kilogram.**
- **In 2022 and 2023, prices for oil palm should stabilize at THB 4-5/kilogram on higher yields**. This will be partly because (i) since 2018, growers have been expanding the area under cultivation (often as a replacement for rubber, rambutan and longkong trees) and supply from these new plantations will begin to become available at the end of 2021. (ii) per rai yields are improving in Indonesia and Malaysia; and (iii) the EU decided to end the use of biofuels made from palm oil since 2021.

Source: Ministry of Commerce (MOC), Krungsri Research

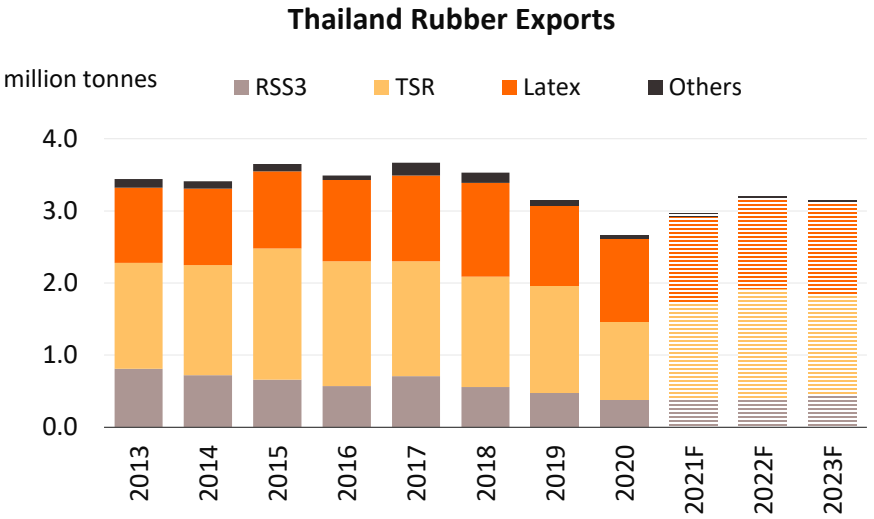
Rice: Competition will be strong from Vietnam and India

Thai Rice Exports



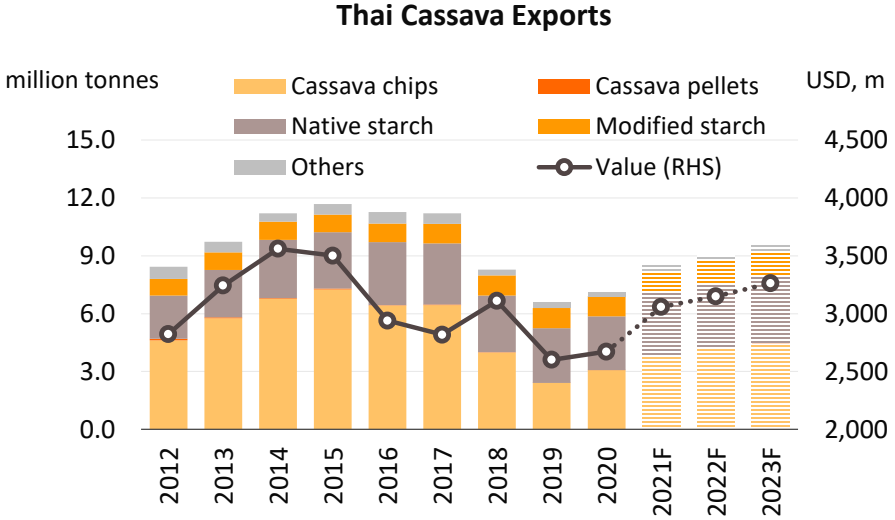
- **In 5M21,** exports of Thai rice crashed by more than 31% due to (i) export prices that were higher than those of Vietnam, India and Pakistan; (ii) a shortage of container capacity, which then delayed exports; and (iii) a switch among trade partners to buying soft rice from Thailand to Vietnam**. In the rest of 2021, demand from the main export markets (Benin, South Africa, and the US) is expected to remain flat, keeping rice exports to be in a range of 4.6-4.8 million tonnes.**
- **For 2022 and 2023**, **rice export is expected to reach 5.5-6.5 million tones**. The supporting factors will include the improving purchasing power of consumers in export markets and more competitive price of Thai rice following output increase.
- The rice industry will include greater competition from other exporting nations, including Vietnam, where rice is close in quality to Thai produce but has the advantage of being more competitively priced. Some rice importers (e.g., the Philippines) are also implementing policies to encourage the domestic production of rice and so reduce their dependency on imports.

Rubber: Growth will come from heavier demand for latex gloves and tires



- **In 5M21,** exports climbed 18.5% YoY on strong demand from Chinese tire manufacturers (32% of all rubber export sales) and a sharp rise in demand for latex gloves, which then pushed up prices for RSS, TSR and concentrated latex by respectively 46.9%, 26.6% and 38.5% YoY. **Through the remainder of 2021, rubber exports are forecast to rise by 7.0%.**
- **Through 2022 and 2023, the export volume is forecast to rise by 3.0-4.0% per year** on: (i) a recovery in global industrial production, particularly, the production of vehicles and of medical devices (latex gloves and other medical equipment made from rubber); and (ii) declining yields for Thailand's competitors (Indonesia and Malaysia will likely experience continuing outbreaks of leaf fall disease). On the domestic market, growth will come from: (i) recovery for downstream consumers, such as tire manufacturers and producers of latex gloves and medical equipment; (ii) greater use of rubber in other product categories (e.g., beauty products and construction materials); and (iii) government supporting measures such as using rubber in dam and road construction.

Cassava: Exports would grow healthily thanks to stronger demand from China



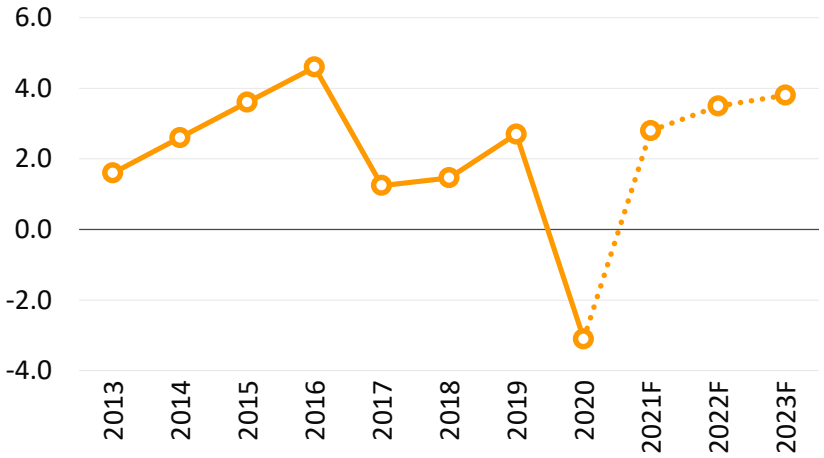
- **In 5M21,** the export volume jumped 36.5%, which then helped to lift export prices of cassava chip and cassava starch by respectively 16.6% and 9.2% YoY. The market was buoyed by stronger demand from China (used in place of corn to produce alcohol, which has become more expensive), and for use as an input into food processing and the production of animal feed, sweeteners and citric acid. However, in the remaining 7 months of 2021, the supply of cassava is expected to tighten and the increase in exports would slow. **Overall export for 2021 is forecast to grow by 19.0%.**
- **In 2022 and 2023, export volume is forecast to climb by avg. of 5.0-6.0%** on continuing strong demand from China; prices for corn are forecast to stay high and cassava will thus be used as a lower cost input into the production of alcohol. In addition, the Thai government is working to build potential new export markets in, for example, Turkey, New Zealand and India. Supply will also grow with government efforts to encourage farmers to turn over more land to cassava cultivation, and this will help to lift outputs by 4-5% per year. However, competition from suppliers in Cambodia and Lao PDR (which enjoy lower production costs) will be stiff.

Source: Office of the Rubber Replanting Aid Fund (ORRAF), Ministry of Commerce (MOC), Krungsri Research

Power Generation: The pace of investment will pick up in solar, biomass, biogas and waste-to-energy power production

Growth of Electricity Demand

(% per annum)



Renewable Energy Capacity under PDP2018 Rev.1

Power plant	Contracted capacity (MW)					
	2020	2021	2022	2023	2024	2037
(1) Government support						**520**
- Waste energy			400	400	400	400
- Biomass			60	120	120	120
(2) Under AEDP *						**18,176**
- Biomass (community)	200	300	400	500	600	600
- Biogas-crops (community)	200	300	400	500	600	600
- Biogas-waste (community)	100	150	183	183	183	183
- Solar hybrid (community)	200	300	390	470	550	550
- New wind			90	180	270	1,485
- Small hydro (EGAT)	-	-	-	-	-	69
- Floating solar and hydro (EGAT)	45	45	45	69	69	2,725
- Solar	50	100	150	200	250	8,740
- Biomass	-	-	-	-	-	2,780
- Biogas	-	-	-	-	-	400
- Industrial waste	-	-	-	-	-	44
Total	**795**	**1,195**	**2,118**	**2,622**	**3,042**	**18,696**

* Alternative Energy Development Plan

- In 4M21, demand for electricity from the industrial sector rose 1.6% YoY on recovery in a range of industries, including auto parts and assembly, industrial gases, household electrical appliance, food and beverages, building supplies, and packaging. However, demand from business and household users contracted by respectively 9.7% and 3.4% YoY. Through the rest of the year, demand is forecast to increase, mainly driven by the growth of industrial sector that would benefit from export expansion. **For the year as a whole, demand for electricity is thus expected to rise by 2.8%.**
- **In 2022 and 2023, power generators should see improving business conditions thanks to demand that is forecast to rise by an average of 3.7% per year** and government support for investment in the industry, as laid out in the Power Development Plan and the Alternative Energy Development Plan. In particular, investment should speed up for domestic rooftop solar installations, biomass power production (community-level producers and public-private community initiatives in the South), biogas producers (for community-level production) and waste-to-energy projects.
- **Competition in the sector has intensified, especially for renewables.** Existing operators have been expanding generation capacity and there have been several new entrants. Notably, there is rising influence from players with strong financial and technological strengths, such as IPPs and SPPs that have a background in engineering, procurement and construction (EPC) because they have the necessary expertise to install electrical systems, or those that manufacture solar equipment. These operators have started to supply renewable power to the grid.

Source: Energy Policy and Planning Office (EPPO), Department of Alternative Energy Development and Efficiency (DEDE), Krungsri Research

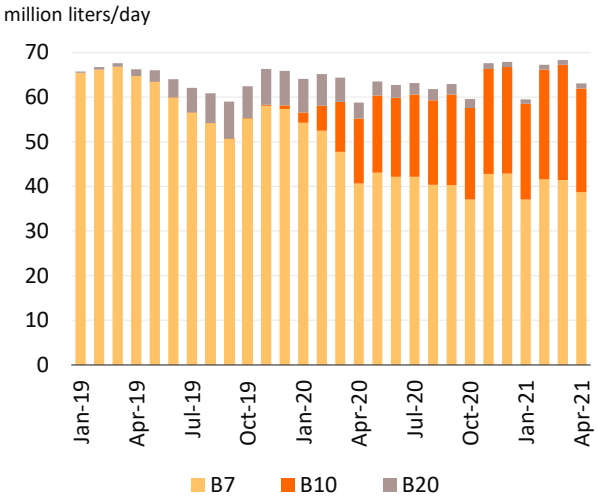
To sustain continuing rates of growth, large players plan to expand their investments both at home and abroad

Company	Investment plans
BGRIM	Plans to add at least 1,000 MW of capacity by the end of 2021 (from both newly constructed power plants and purchases of existing operations) and to have signed contracts for the supply of 7,200 MW of power by 2025.
GULF	Domestic: The company plans to add 1,500 MW of capacity through unit 1 (IPP-662.5 MW, for which the COD was 31 March 2021) and unit 2 (IPP-662.5 MW, for which the COD is in October 2021) of the GSRC program. Overseas: Phases 1-3 of a Vietnam-based offshore windfarm (Mekong Wind) will add 128 MW of capacity, with the COD of this expected for Q2 or Q3 of 2021. Another 326 MW will come from the Omani natural-gas powered DIPWP project. Phase 1 of this (expected to come online in Q3 of 2021) will add 40 MW of capacity, and the whole development should be completed and generating income in 2022.
RATCH	Domestic: The company's 2021 plans are to add 700 MW of capacity, split between 455 MW of baseload power and 245 MW of renewables-powered generation. This has begun with participation in competitive bidding for the provision of 18 MW of community-based power generation in the south of Thailand. The results of the auction will be revealed in August this year and construction of the winning bid should be completed before the end of 2024. Overseas: Negotiations are currently underway to provide at least 500 MW of baseload capacity and no less than 200 MW of renewables capacity.
GPSC	Investment plans for 2Q21 include: (i) The Rayong Waste to Energy (WTE) project, which has a COD for the end of 2021; (ii) the production and distribution of energy storage units, with full capacity of 30 MWh reached by the end of 2021; (iii) the production of an energy recovery unit (ERU), for which commercial operations will begin in 2023; and (iv) the company's SPP replacement (Glow Energy phase 2, which is 25% complete).
SPCG	The company plans to increase investments in solar generation in the EEC. Initially, the company hopes to add at least 500 MW of installed capacity over 2021-2026
TPIPP	The company is preparing to sign contracts for the supply of power from waste-to-energy projects in Nakhon Ratchasima and Songkhla, and is bidding for the supply of power from 9 VSPPs (8-10 MW of capacity) as compensation for the loss of income from the termination in 2022 of contracts to supply power under the ADDER scheme. By 2025, the company also plans to have added another 580 MW of capacity to its current total of 440 MW.

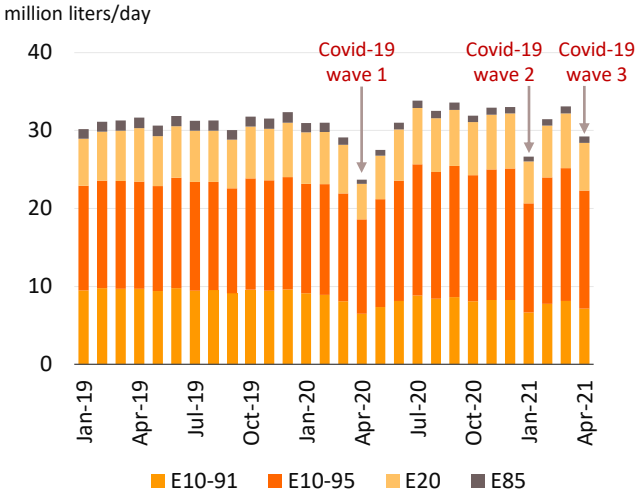
Source: Compiled by Krungsri Research

Biofuels: Demand will be supported by government measures

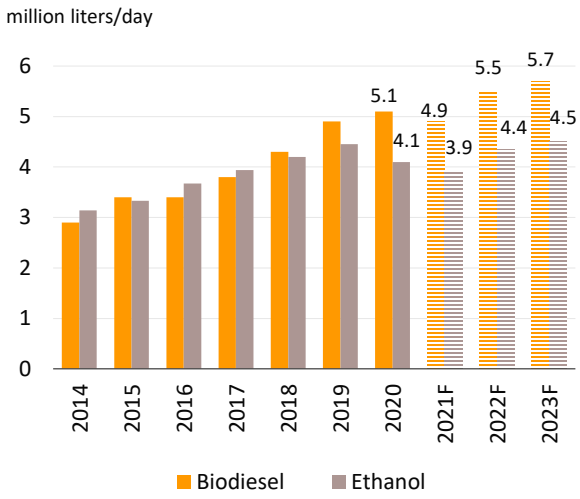
Consumption of B7, B10, and B20
(Average)



Consumption of E10, E20, and E85
(Average)



Biodiesel and Ethanol Demand
(Average)

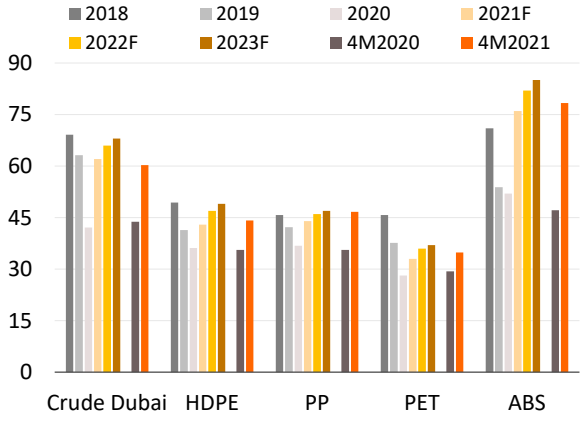


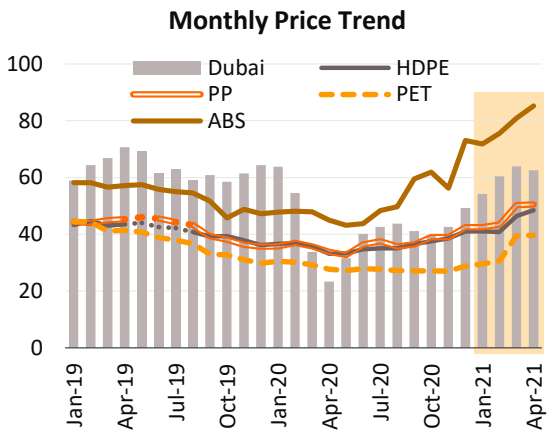
- **In 2021**, although the growth in e-commerce (which should be in excess of 30%) and logistics is expected to rise that support greater activity in the commercial transport sector, overall demand remains sluggish on weakening business condition. **Consumption of biodiesel (B100) is expected to average 4.9 million liters per day (-2.6%). Demand for ethanol is also forecast to fall by -3.1% to 3.9 million liters per day.**
- **Through 2022 and 2023**, demand for biofuels is expected to rise further thanks to government plans to steadily increase the proportion of biodiesel and ethanol mixed in with higher high-grading standard. In addition, demand will be boosted by an increase in the number of vehicles that are able to run on biofuels, as well as by the general lift given to the transport sector by economic recovery post-Covid-19. **Consumption of biodiesel is thus forecast to rise by an annual average of 2.0-3.0%,** with growth strongest for sales of B10 diesel, the standard diesel mix. **Demand for ethanol should increase at the fractionally faster rate of 2.5-3.5% per year** on government plans to increase the contribution of E20 to gasohol sales from 20% in 2020 to 30% and then to set E20 as the standard petrol mix in 2023, this being part of the support provided by the government to cassava and sugarcane growers.

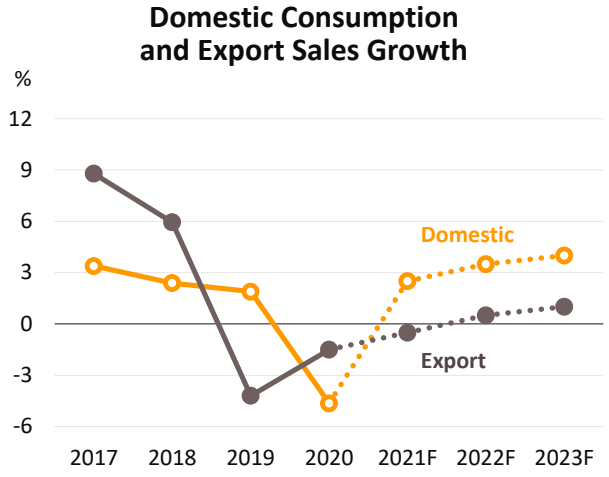
Source: Department of Energy Business (DOEB), Energy Policy and Planning Office (EPPO), Krungsri Research

Petrochemicals: Downstream industries would revive but players may have to contend with higher oil prices and a supply glut

Crude Oil Price *(USD/bbl)* **& Domestic Plastic Resin Prices** *(Baht/Kg)*





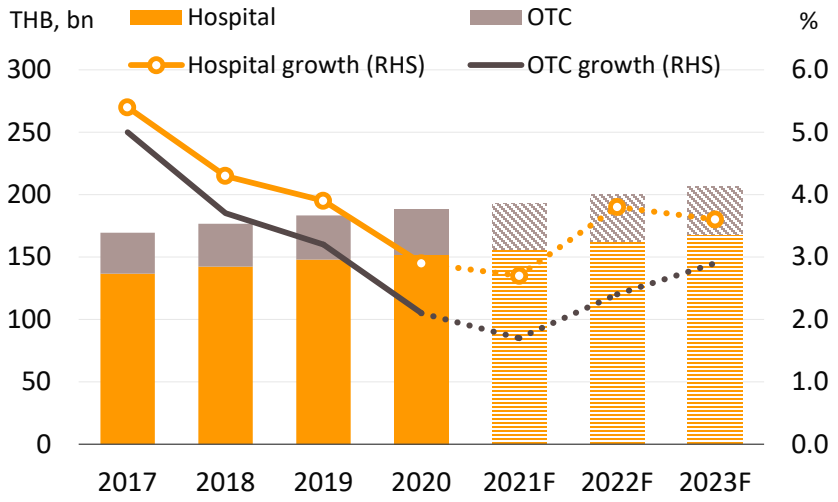


- For 4M21, demand recovers on a general improvement in business conditions at home and abroad. This and the rising cost of crude have then conspired to lift the prices of all major product groups: the cost of polyethylene (PE) is up 24.1% YoY, polypropylene (PP) 31.2%, PET 18.6% and ABS 66.0%. **For the remainder of 2021, demand for petrochemicals for use in downstream industries will strengthen and so domestic consumption is forecast to rise by 1.5-2.5% this year, while the value of exports will increase by 3.0%.**
- **Over 2022 and 2023,** demand from downstream industries (e.g., packaging, construction, auto assembly, and medical devices) will continue to rise, while public health concerns will drive greater demand for PE, PP and PET petrochemicals, all of which are used in the manufacture of single-use plastics. Over these years, **domestic demand is forecast to strengthen by an average of 2.0-3.0% per year, with exports growing at the slightly faster annual average rate of 3.0-4.0%.** World crude prices are also expected to climb to USD 66/bbl in 2022 and then to USD 68/bbl a year later, and this will then increase the cost of production.
- Players will tend to move more heavily into the production of specialty products (e.g., ABS) that are used to manufacture higher value plastics. This will help to better meet demand from, for example, manufacturers of parts used in the assembly of electric vehicles, batteries and medical devices. Players will also likely expand their range of market opportunities by increasing their investments in the production of biodegradable and recycled plastics, rather than relying exclusively on traditional materials.
- Despite this positive outlook, prices and profits may be squeezed by a supply glut caused by an excess production capacity in Asia. This is being caused by the establishment of new petrochemical facilities in China (as a result of Chinese attempts to cut their reliance on imports) and Malaysia (thanks to the PrefChem project, a joint venture between Petronas and Saudi Aramco).

Source: Plastats, The Office of Industrial Economics (OIE), Krungsri Research
Note: Petrochemicals here consist of Ethylene, Propylene, Benzene, Toluene, PE, PP, and PET

Pharmaceuticals: Domestic sales should see continuing growth thanks to rising concerns over personal health

Domestic Pharmaceutical Outlook



- Sales were affected by the worsening situation with Covid-19, which then caused a fall in the number of Thai and non-Thai patients accessing hospital services. **For all of 2021, sales to the domestic market should rise by 2.5%,** compared to 2.8% in 2020. Distribution through hospitals (80% of total sales by value) is forecast to grow 2.7%, while sales from over the counter (OTC) (20% of the total) are expected to increase at the lower rate of 1.7%.

- **In 2022 and 2023**, **the number of patients is expected to increase after the COVID-19 eases, domestic sales is forecast to grow by 3.5% annually** on: (i) rising levels of ill-health in the Thai population, especially of chronic non-communicable diseases, treatment for which typically relies on more expensive imported medicines; (ii) the aging of Thai society; (iii) the extension of comprehensive health coverage to the whole population, which will drive greater demand for generics; and (iv) increasing investment in the production of pharmaceuticals as players look to meet rising demand.
- **Competition could also intensify on:** (i) greater imports of low-cost Chinese and Indian medicines; (ii) entry of new foreign players e.g., Japanese corporations which will produce for exports to the CLMV market; and (iii) Thai businesses in other sector expanding into pharmaceuticals. Production costs will also rise due to: (i) the need to upgrade facilities to meet GMP-PIC/S standards; and (ii) higher prices for imported medicines and active ingredients because of the inflationary effect of COVID-19 on chemical inputs.

Source: Business Monitor International (BMI), FitchSolutions, Krungsri Research

In longer term, the investment prospect remains sound

Higher rates of investment will be supported by: (i) increasing demand for medicines; (ii) government investment promotion schemes administered through the BOI that are targeted at the sector and that offer 5-year exemptions for corporate income tax; (iii) government support for the so-called new S-curve industries (which includes the production of pharmaceuticals) that extends to providing financial support for research and development and additional tax incentives, especially for investments made in the Eastern Economic Corridor (EEC) (in 2020, 4 projects with a combined value of THB 355.1 mn that involved biotechnology R&D and/or biotech-based pharmaceuticals production were approved for investment support); and (iv) the impetus given by Covid-19 to increased research and development of higher-quality pharmaceuticals, treatments and vaccines

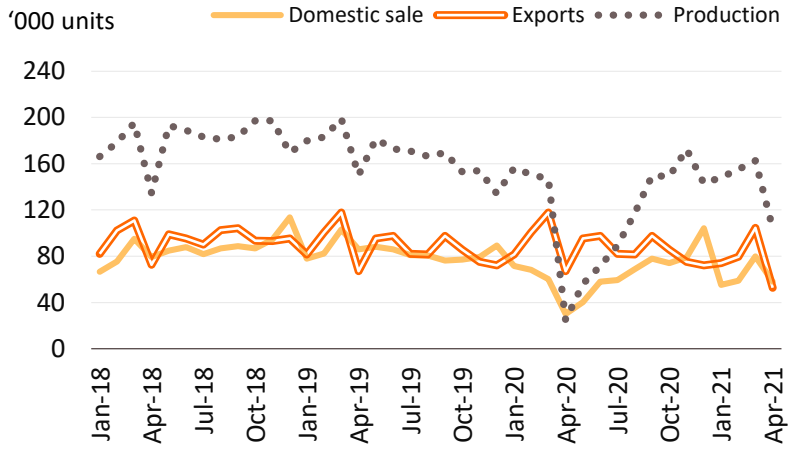
Thai development and production of Covid-19 vaccines: These should be ready for widespread use in 1-2 years

- The National Vaccine Institute (NVI) is working with Chinese partners on stage 2 trials and with other foreign partners to research and test vaccines in Thailand. The NVI is also cooperating with other stakeholders to develop its own vaccine, which is currently being tested on animals before progressing to human clinical trials.
- The Faculty of Medicine at Chulalongkorn University has partnered with BioNet-Asia for phase 1 clinical trials of an mRNA Covid-19 vaccine. Testing will open to volunteers once approval has been granted by the FDA and assuming these are successful, domestic production will begin of 2nd generation vaccines that are more effective against new strains of Covid-19.
- The Faculty of Medicine at Siriraj Hospital, the Faculty of Science at Mahidol University and the Faculty of Medicine at Chulalongkorn University are testing ways of multiplying viruses before inactivating these for use in animal tests.
- The Government Pharmaceutical Organization and the Faculty of Tropical Medicine at Mahidol University are completing phase 1 and phase 2 trials of an inactivated Covid-19 vaccine. Phase 3 trials should begin at the end of 2021 and it is hoped that the vaccine will be ready for approval and large-scale production in 2022.
- Siam Bioscience has been granted a license to manufacture the AstraZeneca-Oxford recombinant viral vector vaccine.

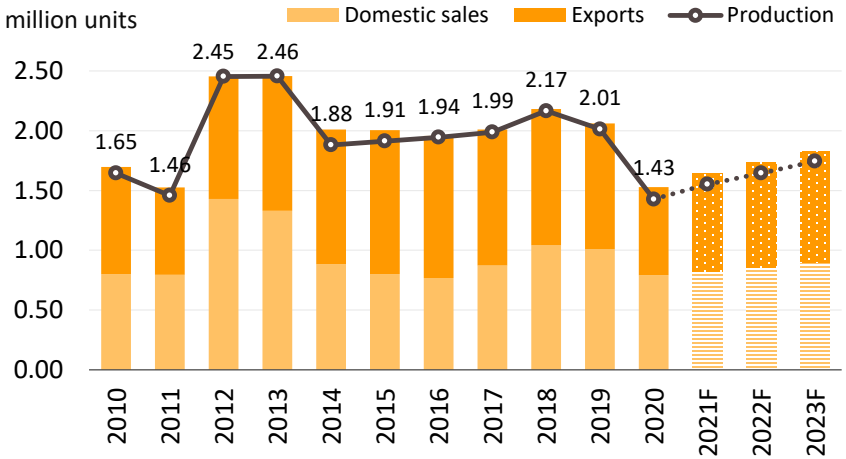
Source: Compiled by Krungsri Research

Automobile: Demand gradually recovers due mainly to improving major export markets

Automobile Production and Sales



Thai Production and Sales Forecast

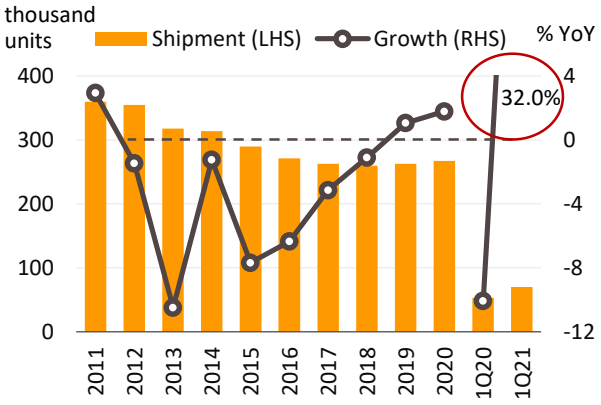


- **Through 4M21,** the number of autos distributed to the domestic market grew 7.1% YoY**,** but recovery in purchasing power remained somewhat fragile as evidenced by deferment of 20-30% of orders placed at the April Motor Show (from a total of 27,800 sales). Meanwhile, lenders have tightened the release of new credit and 20-30% of applications are now refused, compared to essentially zero in the past (source: The Federation of Thai Industries). In light of this, **Krungsri Research now sees growth in the domestic auto market reaching 3.0-5.0% this year.** Exports grew at the solid rate of 14.9% YoY on a sharp growth in the main export markets (43.1% of all export sales by value). Thus, sales rose 63.4% YoY in Australia, 54.8% in Vietnam and 198.8% in Japan. **For all of 2021, the forecast is for an increase in the export value of 12.0-13.0%. Overall, output by auto assemblers would therefore rise by 8-9% in 2021.**
- **For 2022 and 2023, domestic sales volume is expected to rise by an average of 4.0-6.0% per year,** helped by improving demand especially in the areas of construction, online retail and logistics, though at the same time, competition (e.g., on price discounts and through distribution online) will also likely stiffen. **Exports are likely to grow at a slower rate of 5.0-7.0% annually**, with sales fueled by: (i) continuing economic recovery in trading partners; and (ii) the gradual shutting of production facilities in the Philippines, which began in 2019; and (iii) Shortages of ICs should begin to wane from 2Q22 onwards thanks to an expansion in semiconductors production capacity in technology-leading countries.

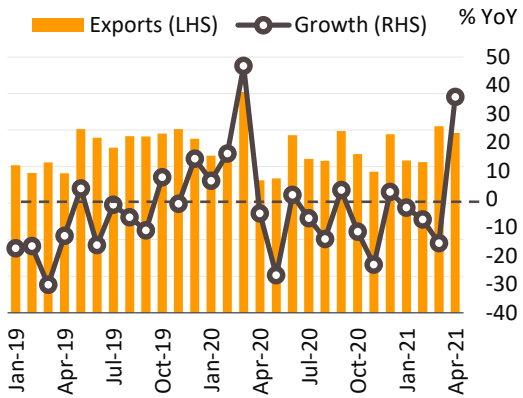
Source: The Federation of Thai Industries (FTI), Krungsri Research

HDD: Exports are likely to grow further due to increasing demand for cloud computing services and data center applications

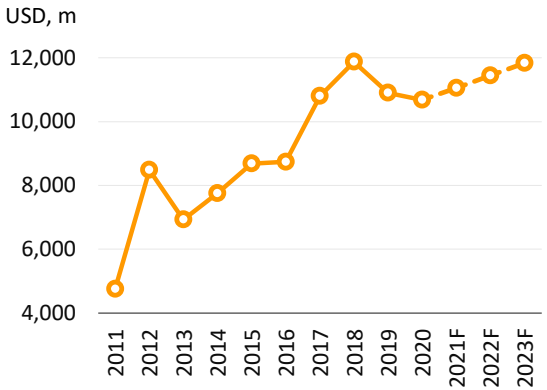
Worldwide PC Shipments



HDD Exports Value



HDD Exports Forecast

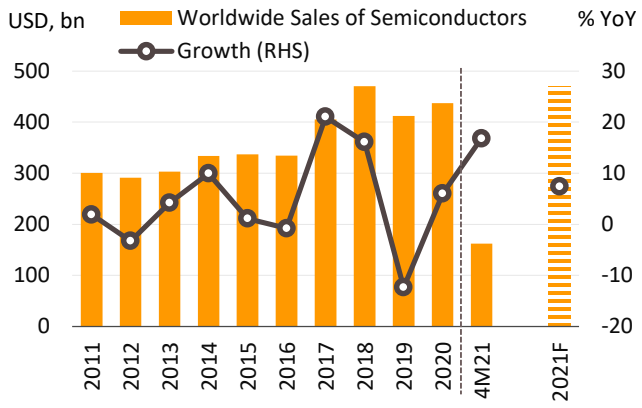


- **In 4M21, export value of HDDs shrank by 0.5% YoY.** However, shipments of HDDs saw a strong growth in four major markets including ASEAN countries (+143% YoY) and the EU (+26.1%) with combined exports of 23.7% of total Thailand's HDDs exports. In addition, there were signs of recovery evidenced by (i) April export grew at an accelerated pace of +35.9% YoY; (ii) world demand for PCs surged by 32.0% in 1Q21. In the rest of the year, export value continued to expand due to increasing demand for high capacity of HDDs for cloud computing and data center services to process big data. **For the whole year of 2021, total export value is expected to grow by 3.0-4.0%.**
- **From 2022 to 2023, export value of HDDs is projected to rise by an average of 3.0-4.0% per year,** boosted by;
  - **Rising demand for high-capacity HDDs for cloud computing and data center applications.** The HDDs are used to store huge amounts of information for big data analysis. Growth has been lifted further by the outbreak of COVID-19 and the strong uptake of cloud computing services to meet the expansion in working from home and distance learning.
  - **Constantly developing new techniques to extend the useful life of HDDs and expand storage capacity; the rapid advances are helping to reduce the price of HDDs per storage unit.** These new production and storage technologies rely on a range of breakthroughs. Together, these should help Thai players to preserve their export market shares.
  - However, demand for HDDs used in PC assembly would weaken globally and HDD manufacturers will face greater competition from alternative products, most notably SSDs.

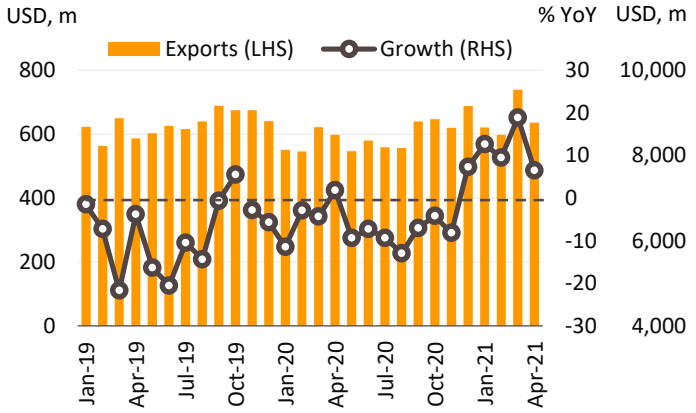
Source: Gartner, Ministry of Commerce (MOC), Krungsri Research

IC: Accelerated demand for electronics will boost IC exports, supply shortage may dissipate in 2H22

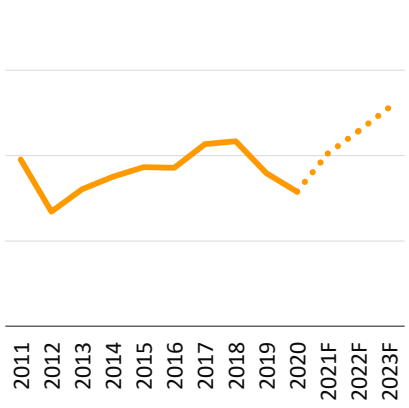
Worldwide Sales of Semiconductors and Forecast



IC Exports Value



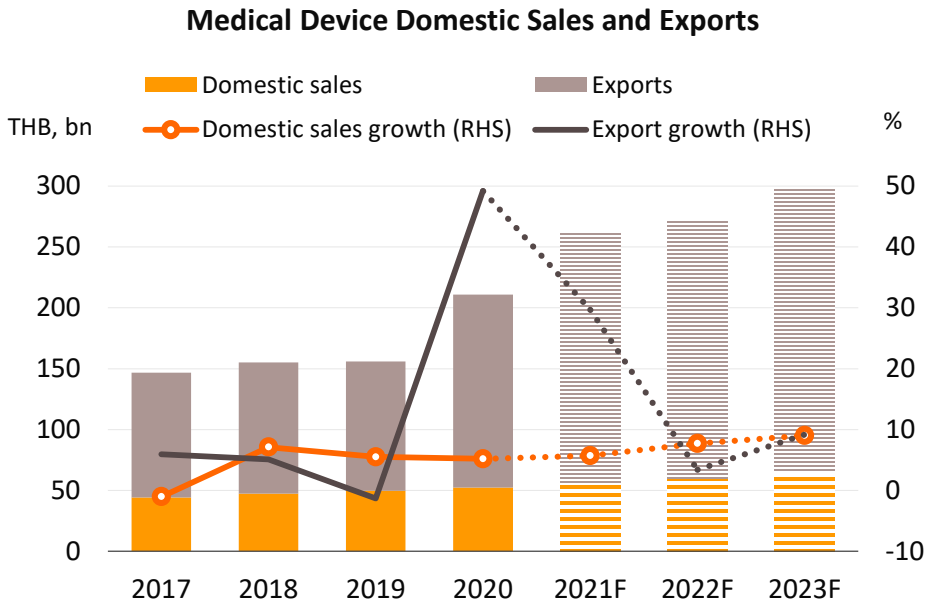
IC Exports Forecast



- **During 4M21, exports of ICs grew by 12% YoY,** driven by accelerated demand after dissipated Covid-19 outbreak. Meanwhile, semiconductor sales in global market also rose by 16.8% YoY. Shipments to ASEAN countries and the US, Thailand's major export markets, had a combined exports value of 33.6% of total IC export value. In the rest of the year, demand for electronics products continue to grow. This would bolster IC exports to grow at 12.0-13.0% in 2021.
- **From 2022 to 2023, export value is expected to grow by 6.0-7.0% per year,** in line with predictions by World Semiconductor Trade Statistics. This positive business environment will be supported by:
  - **Working and learning at home:** This could boost demand for consumer electronics such as PCs, notebooks, tablets, game consoles and smartphones.
  - **Global technology megatrends: (i) the development of auto technology, especially electric and autonomous vehicles,** will need greater software requirements, which will require more ICs (up to 150 compared to about 40 in a standard modern car); and **(ii) the new generation of 5G-compatible smartphones use around 40% more ICs than equivalent 4G devices.** 5G networks will also accelerate the adoption of the internet of things, which will feed into stronger demand for electronic goods and especially, ICs.
- The shortage of IC and chips may fade in 2H22 as an expansion of new capacity needs huge finances and take times to operate.

Source: Semiconductor Industry Association (SIA), Ministry of Commerce (MOC), Krungsri Research

Medical Devices: Increased awareness of personal well-being triggered by pandemic will stoke greater demand



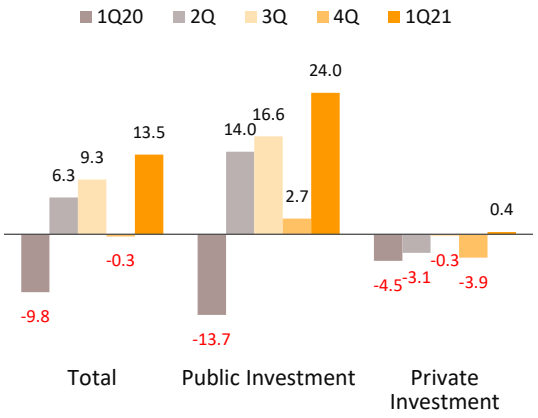
- **During 4M21,** demand for infection-resistant medical devices rose as evidenced by the industry's Manufacturing Production Index which grew at an accelerated pace of 14.5% YoY. Export value of medical devices surged to 52.3% YoY to THB61 bn, Mainly were single-use devices (+61.4%) which accounted for 93.7% of total export value of medical devices. **For 2021, domestic sales of medical devices are expected to grow by 5.7% from 5.2% in 2020 while export value would rise 30-35%.**

- **During 2022-2023, domestic sales of medical devices are expected to increase at an annual average of 8.4%. Export value would average 6.3% per year.** Those will be supported by: (i) increased awareness of personal well-being due to the COVID-19 pandemic which would boost demand for medical equipment related to personal and public health; (ii) rising number of people reported with illness, especially heart disease, stroke, cancer, and diabetes, and the aging society, which will increase demand for modern diagnostic equipment; (iii) investment by private-sector hospitals to expand existing facilities and open new branches; and (iv) the incentives available to companies that invest in the manufacture of medical equipment.
- **Investments from overseas players will continue to flow into the industry** thanks to BOI investment promotion schemes and the waiving of customs duties on imports of parts and materials used in R&D. However, rising investment will also increase competition, especially for SMEs which are the majority of players in the sector.

Source: Business Monitor International (BMI), FitchSolution, Medical Device Intelligence Unit (MeDIU), Krungsri Research

Contractors & Construction Materials: Growth will be driven primarily by spending on government megaprojects

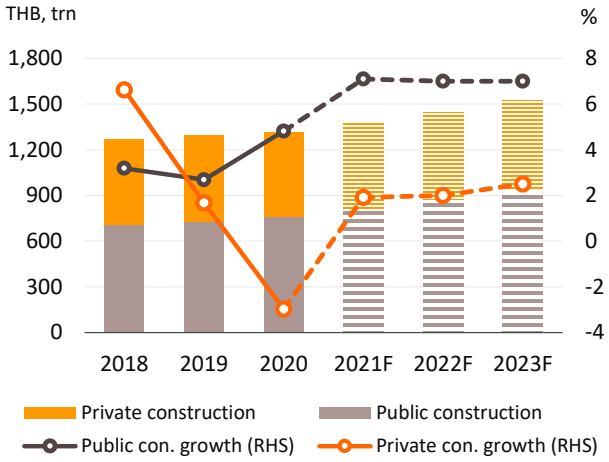
Construction Investment Growth *(%)*



Construction Materials Situation *(4M21)*

Product	Unit (mn)	Production	Domestic sales	Exports
Cement	Tonnes	13.6	12.3	1.3
% YoY		4.5	5.5	-14.1
Construction steel	Tonnes	1.4	1.5	0.2
% YoY		7.6	3.0	-8.5
Ceramic tiles	Sq.m.	46.6	58.0	6.7
% YoY		6.9	8.8	33.8
Sanitarywares	Pieces	2.4	1.1	1.5
% YoY		3.0	6.4	31.9

Construction Investment Forecast
(at Current Market Price)

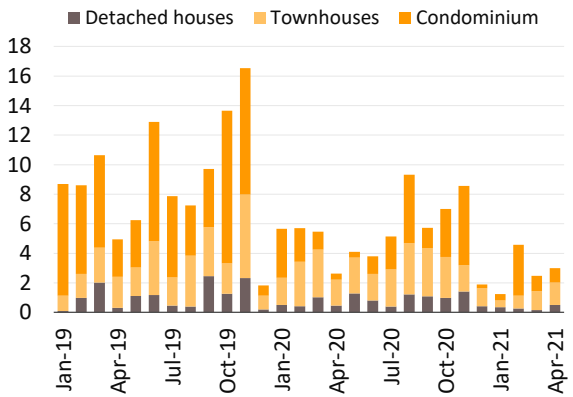


- **In 1Q21,** the construction sector grew by 13.5% YoY driven by a 24.0% YoY rise in spending by the public sector, and private-sector construction grew by just 0.4% YoY in the quarter. This helped to boost demand for construction materials, with sales of cement and construction steel rising by respectively 5.5% YoY and 3.0% YoY, while sales of tiles and sanitary wares were also up by 8.8% YoY and 6.4% YoY. In the rest of 2021, the construction sector is likely to be lackluster due to the decision by the authorities to lockdown the accommodation of migrant workers (to prevent the spread of Covid-19), many of whom work as laborers. **For the year overall, spending on construction is now forecast to grow by 5.0%.**
- **Through 2022 and 2023**, **overall investment in construction is predicted to rise by 5.0-6.0% annually**. The heavy lifting will be done by the public sector, with government-backed projects which are expected to rise by 7.0% per year on investment in megaprojects connected to the EEC (e.g., on phase 3 of the Map Ta Phut port development and the construction of the high-speed rail-link connecting the area's 3 airports, for which ground has already been broken). This will then help to attract additional private-sector investment, which should grow by an annual average of 2.0-2.5%, especially residential projects near the new metro lines in Bangkok and in major provinces. With the increase in construction work, demand for building materials will naturally strengthen, and sales of cement and construction steel will rise. This will be helped further by the government's 'Made in Thailand' scheme, which requires contractors working on government-funded projects to use at least 90% Thai-produced steel (by value or volume).

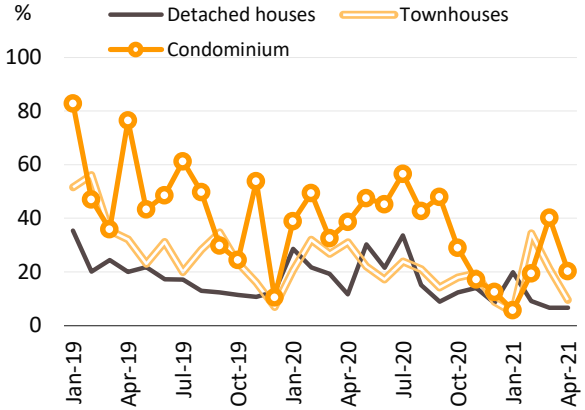
Sources: Office of the National Economic and Social Development Council (NESDC), The Office of Industrial Economics (OIE), Krungsri Research

Housing in BMR: Gradually recover in accordance with economic conditions

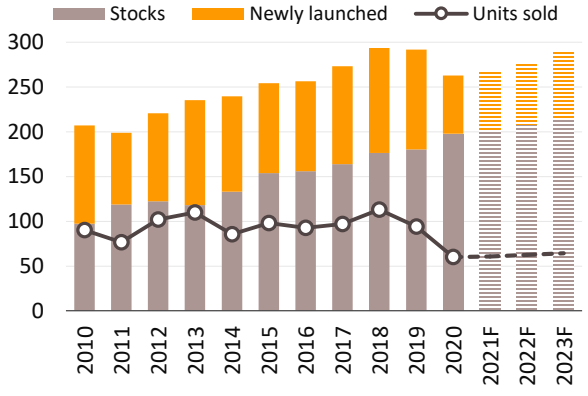
New Supply
(Units, thousand)



Take-up Rate



Total Supply
(Units, thousand)

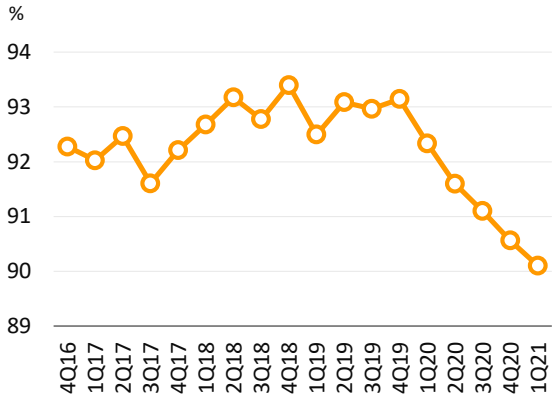


- **The BMR housing market remained in a depressed state in 4M21**. New units launched slumped 42.0% YoY as developers held off work on new projects and instead tried to run down their existing stocks of unsold properties. Demand also continued the contraction that set in in 2020. Thus, as of April 2021, the take-up rate for new units remained very low in all the main segments, standing at 20.3% for condominiums (compared to an average of 57.3% for the previous 3 years) and at just 9.5% and 6.6% for townhouses and detached houses, respectively (against 3-year averages of 35.2% and 28.3%)**.** For the remainder of 2021, demand would continue to be sluggish from worsening COVID-19 impact. **As such, 2021 pre-sales are expected to remain flat**.
- **The market is likely to recover gradually in 2022 and 2023**, **helped by purchasing power that will recover with forecast economic growth of 3.0-3.5%** per year and the reopening of the country to international tourists and business people. **The supply of new housing is expected to rise by 6.0% per year**, with this split approximately equally between condominiums and low-rise developments. Supply of the latter will steadily rise as developers look to meet growing real demand, while investors will also tend to work on a more diverse range of project types that will include mixed-use developments, wellness residences, housing for the elderly, smart homes and leasehold properties.

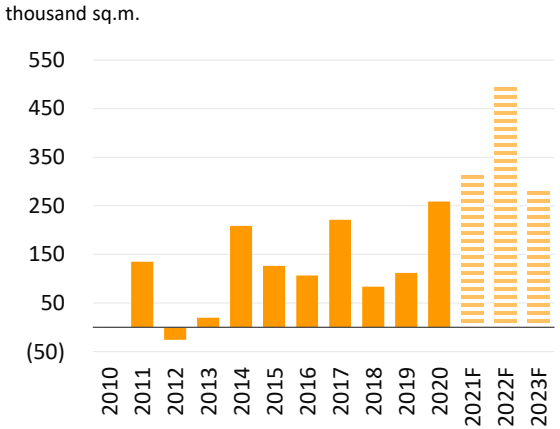
Source: Agency for Real Estate Affairs (AREA), Krungsri Research

Office Buildings: Demand recovers at a slow pace amid huge supply, leading to a fall in the occupancy rate to multi-year lows

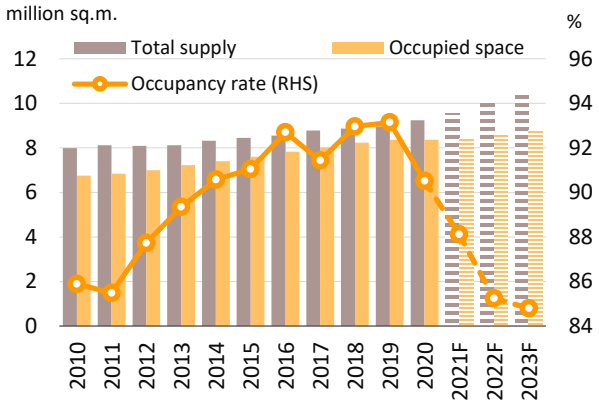
Occupancy Rate



New Supply in BMR



Office Space in BMR

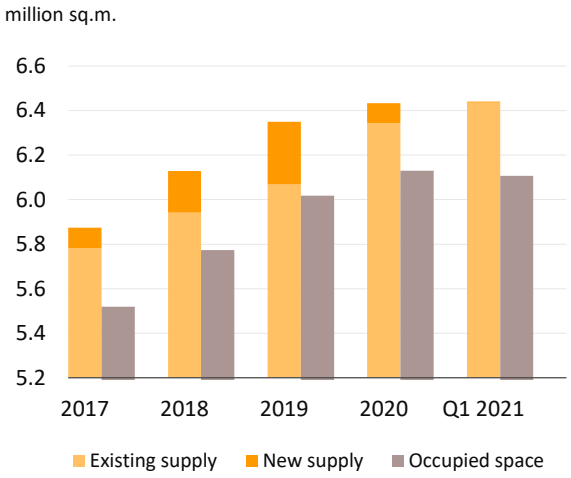


- **In 1Q21,** demand for space rental fell in the wake of business shutdown, which caused a reduction in occupied space. However, businesses still benefit from demand from E-commerce and logistics businesses, and a rent reduction (to attract more leasees). Hence, demand for space rental fell at just 0.5% YoY at 8.3 mn sq.m. But supply rose by 1.8% to 9.3 mn sq.m. The occupancy rate plunged at 90.1%. **For 2021, demand for office space is likely to increase at a slower rate of 0.6%. Supply would rise at 300,000 sq.m. approximately. As a result, the occupancy rate would sink at 88% in 2021 from 90.5% in 2020.**
- **In 2022-2023, demand for rental office space is projected to rise by an average of 1.8-2.3% per year, compared to an annual average of 2.5% over 2015-2019.** That is premised on a potential rise in purchasing after the COVID-19 crisis. However, new office space currently under construction and scheduled for completion over 2022-2023 is projected to add 784,000 sq.m. to supply, rising by 4.0% each year. This will pull down average occupancy rate to 85% in 2023. This would make it difficult to increase rents.
- Competition will intensify, while supply would increase. In addition, still-prolonged work-from-home activity and growth of shopping online encouraged businesses to make the most efficient use of their office space. Some businesses will attempt to control/reduce costs and minimize risks, possibly by reducing headcount, and require less office space. Given the changing business environment and evolving demand for office space, landlords need to adjust their operations.

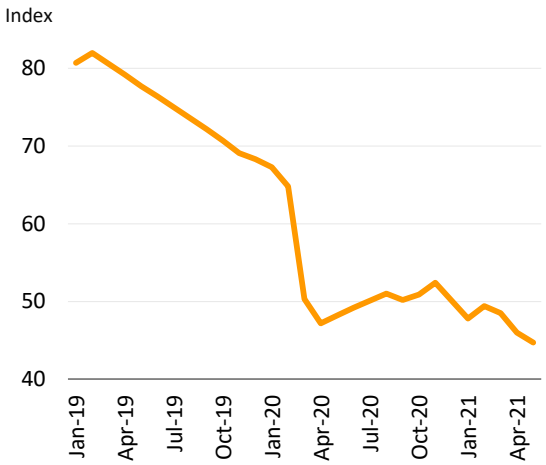
Source: CBRE Research, Krungsri Research

Retail Space: Occupancy rates expected to slip to 88-91% given the large extension in supply that is occurring alongside a slowing of demand

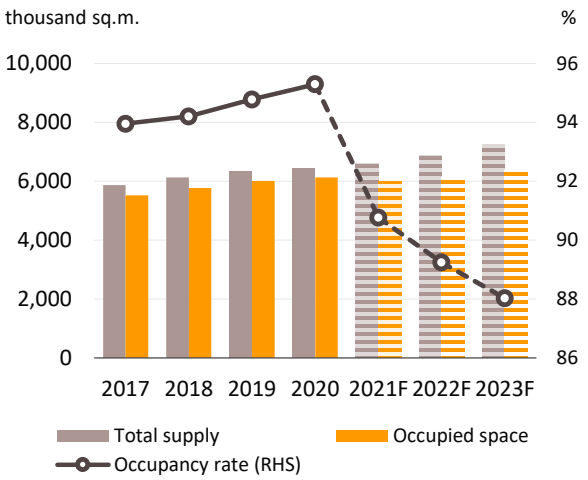
Existing and New Supply



Consumer Confidence Index



Retail Space in the BMR

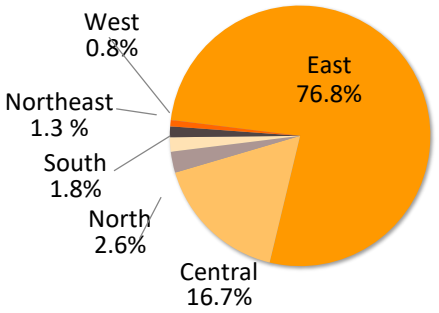


- **In 1Q21,** the area of retail space leased out grew slightly as players cut rates to boost demand and given growth in supply of just 5,000 sq.m. (the Lasalle's Avenue development), the occupancy rate fell at 94.8% in 1Q21 from 95.8% in 4Q20. However, the consumer confidence index has been sliding and through the remainder of 2021, demand is expected to weaken on the continuing sluggishness in the economy and the depressed state of the tourism sector. The supply of new retail space would grow by some 176,000 sq.m. **As such, for 2021, the total footprint of rented retail space is expected to contract 2.2%, bringing the occupancy rate down to 90.8%.**
- **In 2022-2023**, the situation should improve, with recovery in the tourism sector and a rebound in confidence and consumption. Progress on government infrastructure projects will also attract private investment, including the supply of rented retail space.
- Players face major long-term challenges in the form of the rising popularity of e-commerce, as well as from an expansion in the supply of new retail space in several large new projects that are currently being developed.

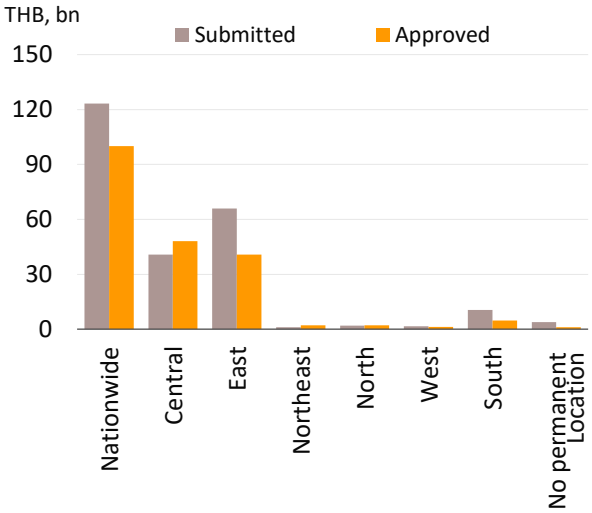
Source: CBRE Research, University of the Thai Chamber of Commerce (UTCC), Krungsri Research

Industrial Estate: Investment tends to escalate, especially in the EEC

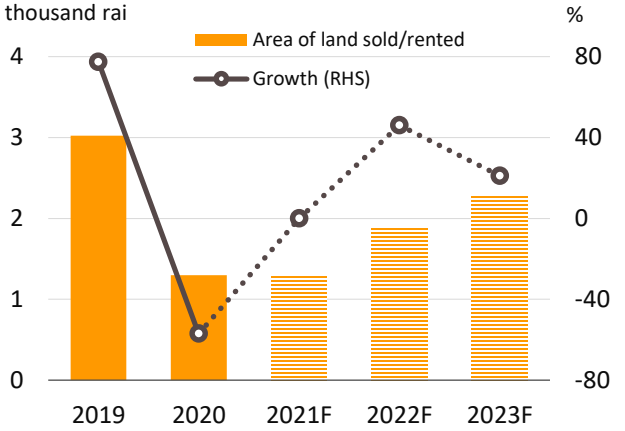
Thai Industrial Estates Total Area by Region (2020)



Value of Applications Submitted & Approved by Location (1Q21)



Forecast Sales/Rentals on Industrial Estates

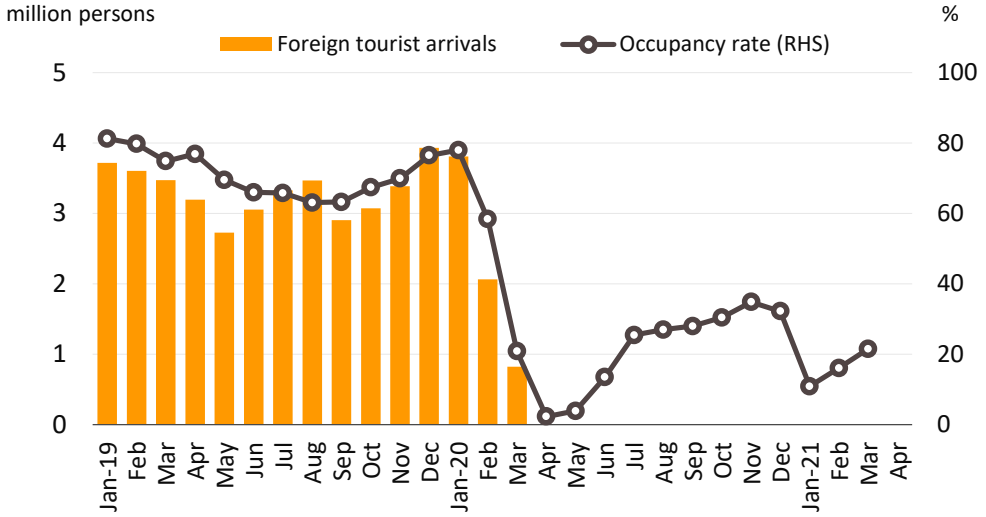


- **In 1Q21,** sales and leases of land on industrial estates crashed 66.1% from its level in 1Q20 to just 473.8 rai. Land on industrial estates in the east of Thailand attracted by far the most interest from investors, a fact reflected in applications to the BOI for investment privileges; in 1Q21, applications for projects in the East had a total value of THB 65.8 billion, or 53% of the value of all such applications. For the remainder of 2021, interest should hold up and **so for the year as a whole**, **industrial estate sales and leases should total around 1,300 rai, similar to those in 2020.**
- **In 2022 and 2023, sales and leases of land are expected to see average growth of around 20% per year to 1,900 rai and 2,300 rai in each of these years**. These will be supported by: (i) a recovery in the world economy that will then lift demand for Thai exports; (ii) progress on government infrastructure projects, especially in the EEC, which will support growth for industrial estates in the East; and (iii) rising confidence among foreign investors that will move with a better economic outlook. In addition, trade diversion that may be generated by the US-China trade conflict, supporting the growing tendency to move to expand production facilities in Thailand.
- Industrial estate developers are in the process of preparing stronger demand in line with an economic recovery by developing new estates on the model of 'smart parks'. These are typically equipped with modern production technology and communication systems and environmentally-friendly power supplies, making them suitable for modern industrial applications.

Sources: Real Estate Information Center (REIC), Board of Investment (BOI), Krungsri Research

Hotels: Foreign tourist arrivals are expected to number just 20 million by the end of 2023, compared to 39 million arrivals in 2019

Tourist Arrivals in Thailand & Hotel Occupancy Rate



Phuket Sandbox Target (Third Quarter)

Month	Number of Foreign Tourists	
	Short-hual Market	**Long-hual Market**
	Singapore, Vietnam, South Korea, Hing Kong, Taiwan and Japan	UK, Germany, Russia, France, USA, Nordic countries,* and GCC conutries**
July	6,000	23,700
August	15,000	32,300
September	23,000	29,000
Total	**129,000**	

Note: * The Nordic countries are Denmark, Finland, Iceland, Sweden and Norway
** The GCC countries are Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and UAE

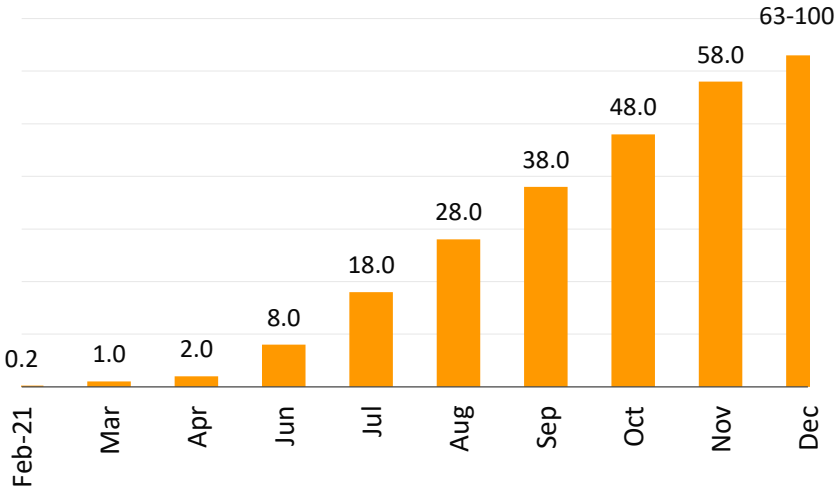
- **In 4M21, foreign arrivals shrank by 99.6% YoY to 28,701.** Domestic tourism was also weaker, though at 22.5 million trips, this fell at the much less extreme rate of -10.2% YoY. The Covid-19 pandemic also continued to hurt hoteliers, with the overall hotel occupancy rate for this period at the very low level of 15.8%, compared to 39.9% for 4M20. For the rest of 2021, worse-than-expected condition of COVID-19 would stumble the government project to reopen foreign tourists such as 'Phuket Sandbox' model and other tourism schemes. **For 2021, the number of foreign arrivals are expected to decline to 210,000 (-96.9%). Domestic tourism is forecast to total 45.1 million trips (-50.2%). As such, the hotel occupancy rate should average 18.0%, compared to 29.5% in 2020.**
- **In 2022-2023, the hotel industry should see a recovery as the tourism sector returns to life. Tourist arrivals are forecast to increase at 5.6 million in 2022 and 20.7 million in 2023. Domestic tourists are predicted to make respectively 75 million and 100 million trips.** The main factors supporting a return to growth in the industry will be: (i) progress with Covid-19 vaccination programs, which will help to reestablish confidence among tourists in many countries; (ii) the reopening of international travel and the relaxation of pandemic control measures as vaccination drives achieve completion and herd immunity is reached; and (iii) strong pent-up demand that will be released in the post-pandemic environment.

Sources: Ministry of Tourism and Sports (MOTS), The Tourism Authority of Thailand (TAT), Krungsri Research

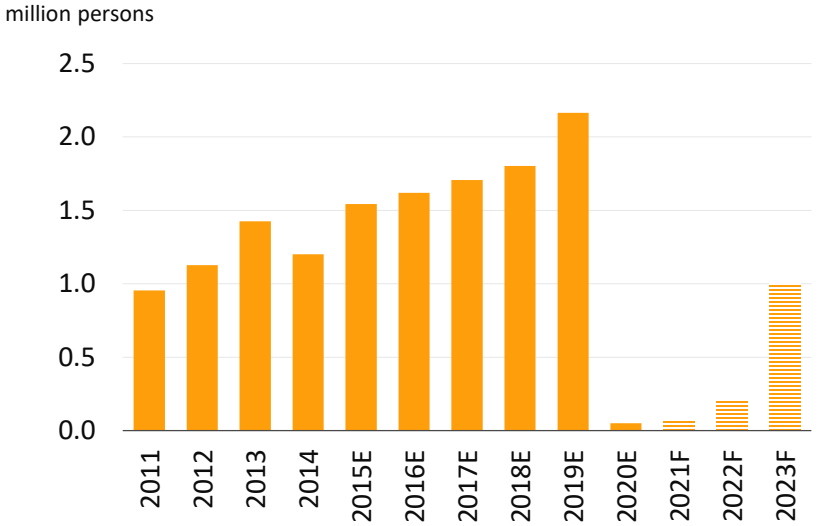
Private Hospitals: Revenue rebounds after mass vaccination program

Thailand's COVID-19 vaccine procurement plan

(Million doses)



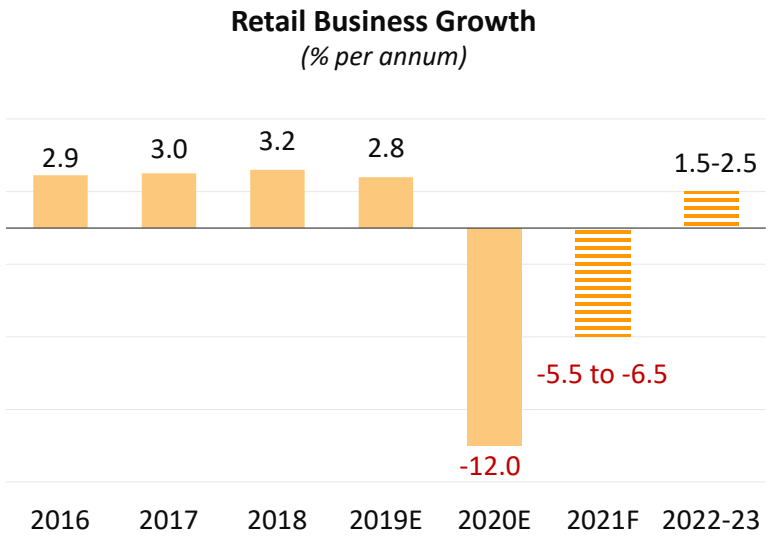
Number of Foreign Patients in Thailand

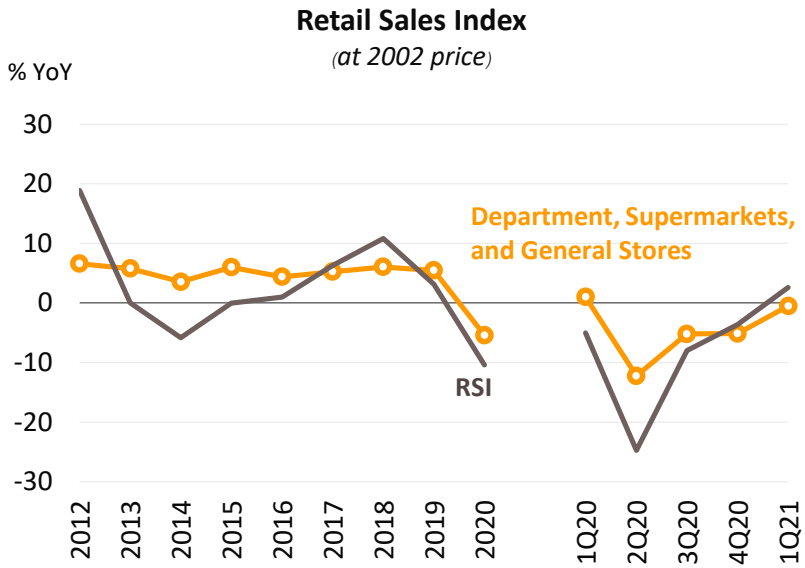


- **In 2021, the pandemic leads to a significant drop in hospital visits as patients postponed non-urgent treatments over fear of infection and the need to maintain social distancing measures.** Revenues of private hospitals remained fragile due to weaker domestic purchasing power, intensifying domestic competition and large private hospitals had depended on overseas customers. However, private hospitals that target patients with public health insurance were able to sustain their revenues. **Krungsri research forecast that revenue will shrink by 10.0-12.0%.**
- **In 2022-2023, private hospitals' revenue would grow by an average of 3.5-5.5% per year.** This is premised on gradually recovering consumer spending and returning of medical tourists. Private hospitals are trying to penetrate new markets by investing in the development of comprehensive supply chains; such as, (i) expanding existing sites and building new branches in Bangkok and upcountry (ii) building partnership with other hospitals to penetrate new, high-potential markets (iii) developing competitiveness by establishing a unique value proposition (iv) expanding market channels to non-hospital businesses (v) increasing the share of foreign patients.

Source: National Statistical Office (NSO), United Nations, Office of the National Economic and Social Development Council (NESDC), Krungsri Research

Modern Trade: Sales should see improvement through 2022 and 2023



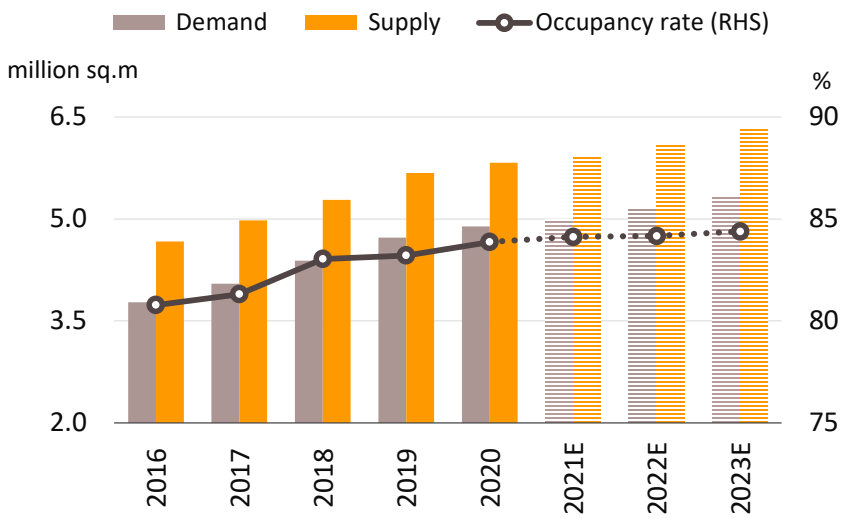


- **In 1Q21,** consumer spending power improved slightly, as reflected in only 2.6% YoY increase in the retail sales index and the slowing in the drop in the index of sales from department stores, supermarkets and general stores to just -0.5% YoY. For the remainder of 2021, consumer purchasing power is expected to remain weak as the impacts of the latest and most severe wave of Covid-19 take their toll. However, government stimulus spending and the partial reopening of the tourism industry in some areas may go some way to offsetting this, and **for 2021 overall, income for modern trade outlets is expected to contract by between 5.5% and 6.5%, compared to 2020's drop of 12.0%.**
- **For 2022 and 2023**, **sales are forecast to strengthen by 1.5-2.5% annually**, supported by: (i) somewhat slow economic recovery that will help to lift domestic consumer spending power, aided further by an increase in the number of foreign arrivals that is forecast to reach 9.05 million in 2022 and 20.7 million in 2023; (ii) progress on new infrastructure projects that will spur the expansion of adjacent communities and stimulate greater spending; and (iii) growth in the CLMV economies, which will stimulate stronger sales in border regions.
- Operators will try to expand revenue streams and consumer base by: (i) blending on- and off-line shopping; and (ii) opening new branches. Some operators will also increase investment in neighboring countries to meet rising demand.

Source: Thai Retailers Association (TRA), Bank of Thailand of Thailand (BOT), Krungsri Research

Warehouse Space for Rent: Demand expected to be lifted by a recovery of economic activity and growth in e-commerce

Supply and Demand for Warehouse Space

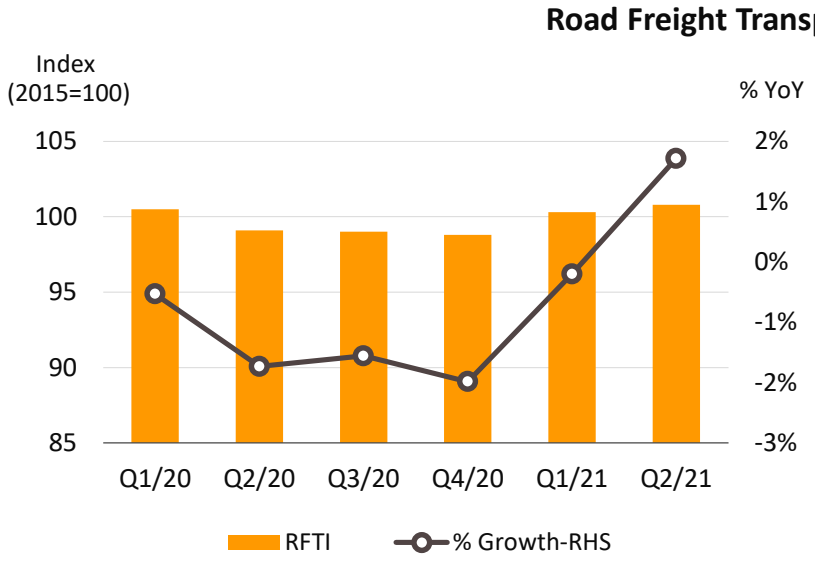


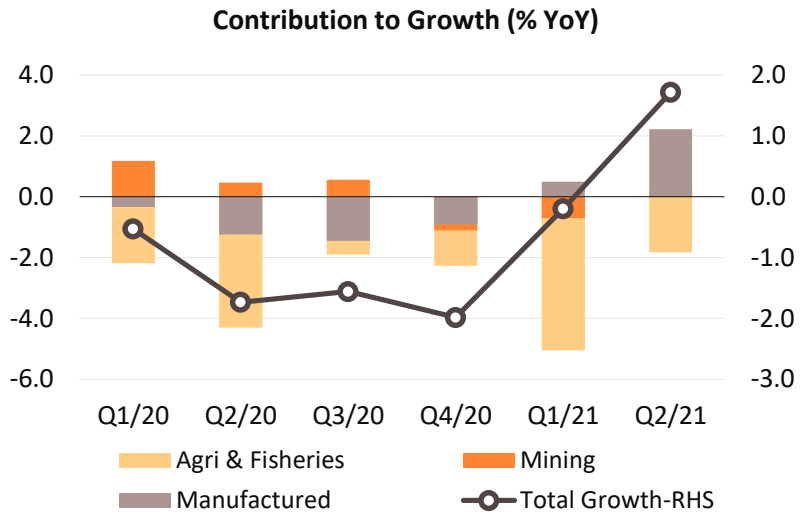
- **The total footprint of rented warehouse space should rise by 1.7% in 2021,** a slowdown from the 2.7% growth seen in 2020. The main support for growth is coming from expansion in the e-commerce, food and logistics industries, all of which have benefited from the sharp rise in working from home. In addition, operators of warehouses in the EEC are able to take advantage of rising demand for space from manufacturers of electronics and pharmaceuticals, as well as from overseas investors (especially from China). Overall, players are tending to keep rental rates unchanged as they look to retain customer base. **Given these, the occupancy rates are expected to rise to 84.1% from 83.9% in 2020.**

- **For 2022 and 2023, demand is expected to escalate by an average of 3.4% per year,** helped by: (i) economic recovery that will feed into greater activity in manufacturing and sales; (ii) an acceleration in spending on government megaprojects, which will stimulate demand for warehouse space for the storage and distribution of goods in new areas; and (iii) an increasing preference among consumers for the 'new normal' of shopping online, which will encourage players to take on more warehouse space as they look to meet future demand. Major new entrants to the market will also tend to develop 'built to suit' properties (at present these are scarce in the market) to meet demand that is likely to rise in the coming period. **Given these tailwinds, the area of warehouse space rented out will rise by some 3.5% per year, while the occupancy rate is expected to climb to an average of 85.6%.**

Source: WHA Premium Growth Real Estate Investment Trust (WHART), Krungsri Research

Road Freight Transportation Service: The market sees an improvement, encouraged by spending on infrastructure and growth in e-commerce

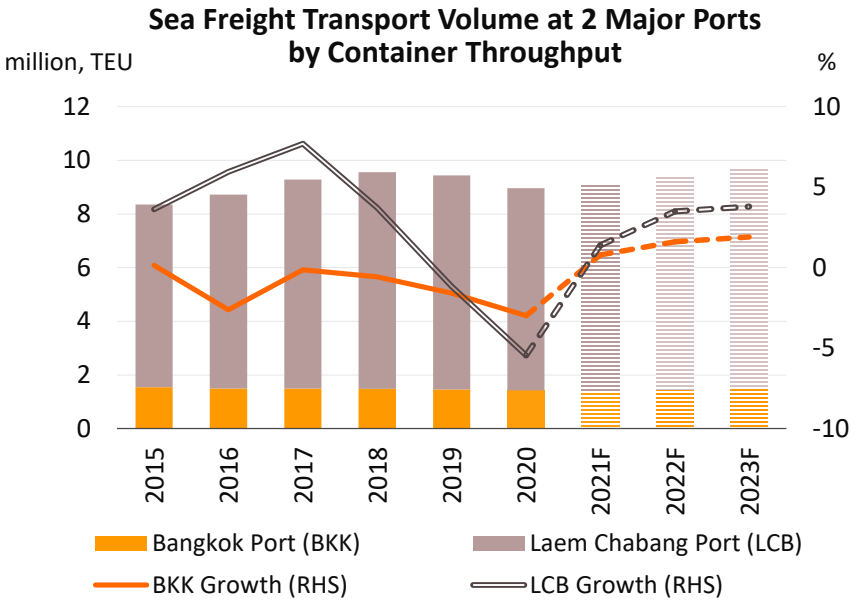


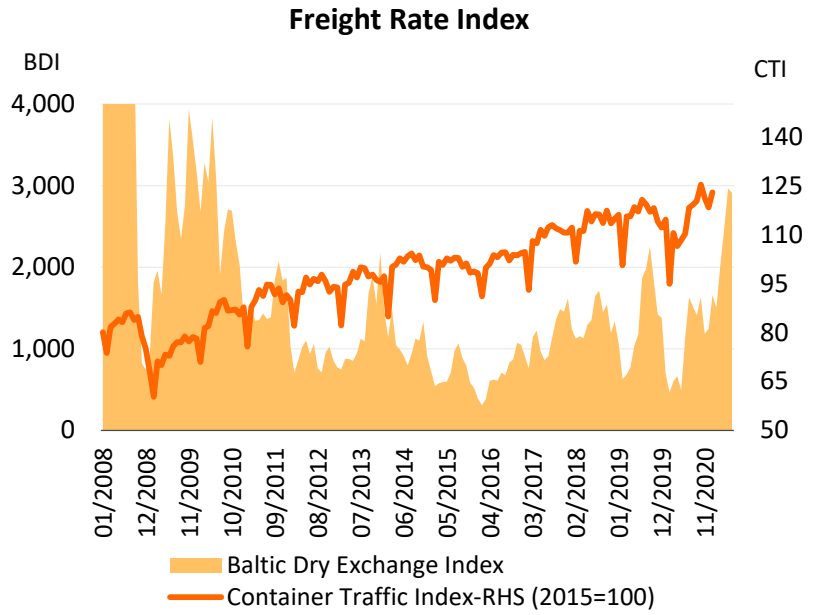


- **In the first quarter of 2021,** the Road Freight Transport Index weakened by 0.2% YoY. This was caused by a 5.0% drop in road freight for agricultural and fisheries products (downstream industrial consumers in these industries have yet to recover) and a 0.7% drop in road freight from the haulage of mining goods. Against this, road freight of industrial goods rose 0.5% on stronger demand for consumer goods from households and from the construction industry. In the rest of 2021, demand for haulage services is expected to strengthen as the country moves into the rainy season and many fruits are harvested, while the emergence of new waves of Covid-19 will also increase demand for household consumer goods.
- **For 2022 and 2023,** demand for haulage services is likely to increase with the economic recovery, in particular, from greater spending on infrastructure that will stoke stronger demand for the transport of construction materials, and from rapid growth in e-commerce that will average 20-30% per year. In addition, economic growth in neighboring countries will help to increase the volume of goods moved in border regions and across national frontiers. Players will also tend to overhaul extend their services by, for example, opening distribution centers in special economic zones and increasing their reliance on automation (as a response to labor shortages).
- The industry will face stronger competition on price and rising labor and fuel costs, which may adversely affect smaller players or those that are not part of extended commercial networks.

Source: Ministry of Commerce MOC), Krungsri Research

Sea freight services: Income should grow strongly with increased freight rates coupled with global economic recovery



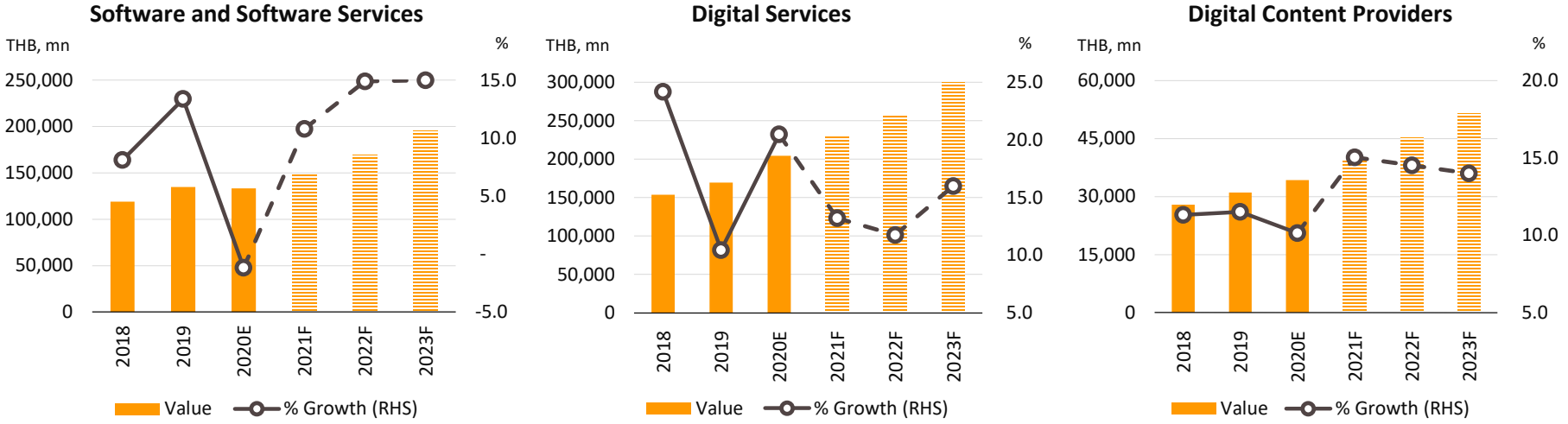


- **Through 5M21,** sea freight operators benefited from recovery in world trade and the boost that this then gave to Thai imports and exports, while a shortage of container/shipping capacity has also had a profound impact on prices. Thus, the BDI rose 264% YoY, while for 20-foot and 40-foot containers, prices jumped by an average of 148.7% and 149.6% for Thai-US (West coast) shipping and by 397.2% and 425.2% for Thai-European shipping. These shortages are likely to persist for the rest of the year and this will then help to support a continuation of these strong price increases.
- **In 2022 and 2023,** sea freight companies will benefit from a number of positive influences. (i) The WTO predicts global trade would average 6.2% per year, which will then support greater demand for exports. (ii) Investment in utilities and infrastructure will pick up across Asia, especially water transport (e.g., for canals/transportation channels and dry and deep-water ports). This will then make it easier and more convenient to connect onwards from Thai transport networks. (iii) Increasing liberalization of trade and transport in Asia will provide operators with the opportunity to expand their area of operations, for example, by opening new shipping lines. The shortage of container and shipping space that is currently affecting the market is expected to ease in the second half of 2022, leaving prices stable but high before falling again in 2023. However, some point of concern include: (i) rising costs due to higher oil prices and the additional overheads entailed in meeting IMO standards; and (ii) greater competition from large international players that will increasingly fight for space in the South East Asia market.

Note: IMO= International Marine Organization
Source: Ministry of Commerce (MOC), Krungsri Research

Digital: Income would continue to grow propelled by technological advances and changes in consumer lifestyles that increasingly favor online business

Revenue Growth of Thai Digital Industries



- **In 2021,** growth in income for digital businesses and providers of digital content will tend to pick up on the impact of social distancing measures and the increase in working from home, which is then feeding into much stronger demand for digital platforms and online services. At the same time, much of the expansion in demand for software is coming from the provision of software services to businesses, especially in the form of '**software as a service' (SaaS)**. This year, software providers, digital services, and digital content providers are thus forecast to see growth of 10.8%, 13.2% and 15.0%, respectively.
- **In 2022 and 2023**, digital industries can look forward to growth of 13-15% per year.
  - **The software industry:** Income is forecast to increase by 14.9% per year on greater demand from businesses for **data processing software, SaaS and customized software** that is developed to meet the needs of individual clients.
  - **Digital services:** Income is expected to rise by 13.4% annually. Growth in this segment will be underpinned by consumers' growing familiarity with digital platforms, driven in particular by greater uptake of e-transaction, e-retail and e-content services. This will be followed in importance by FinTech applications, especially e-wallets, but the large number of players active in the market means that competition can be fierce.
  - **Digital content providers:** Income is predicted to grow by 14.3%, helped by lifestyle changes which mean that consumers now have a growing preference for relaxing by consuming entertainment on smart devices, in particular by playing streaming games and shopping online.

Source: Digital Economy Promotion Agency (DEPA), Krungsri Research

KRUNGSRI RESEARCH

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