

ELECTRONICS INDUSTRY GLOBAL VALUE CHAIN  
IN THE TIMES OF COVID-19:

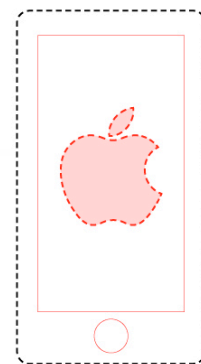
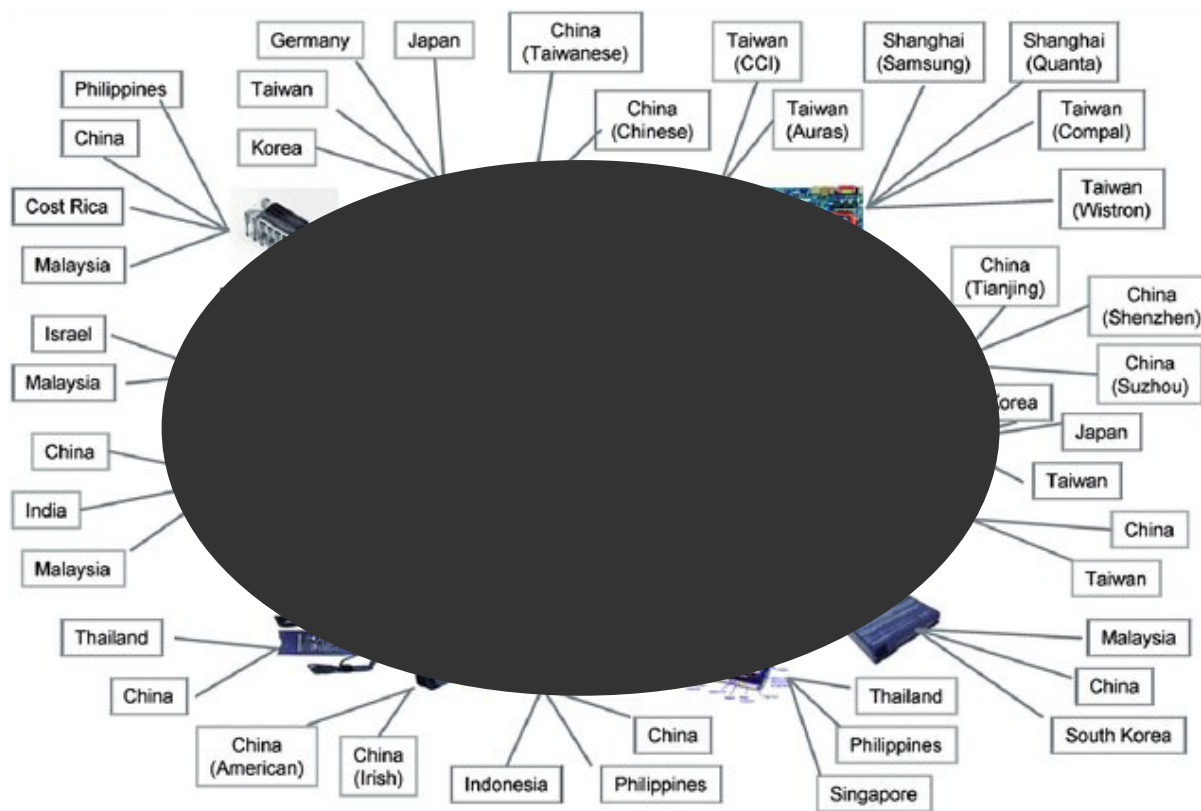
RECOVERY, RESTRUCTURING & REGIONALISING

(A FOCUS ON LEAD FIRMS AND CONTRACT MANUFACTURERS)

*Gale Raj-Reichert*

*30.10.2020*

*24<sup>th</sup> Forum for Macroeconomics and Macroeconomic Policies*



## California, US

Apple designs the iPhone at its headquarters in California. It sends out orders for parts to dozens of companies all around the globe.



## Texus Instruments

makes the touch screen controller

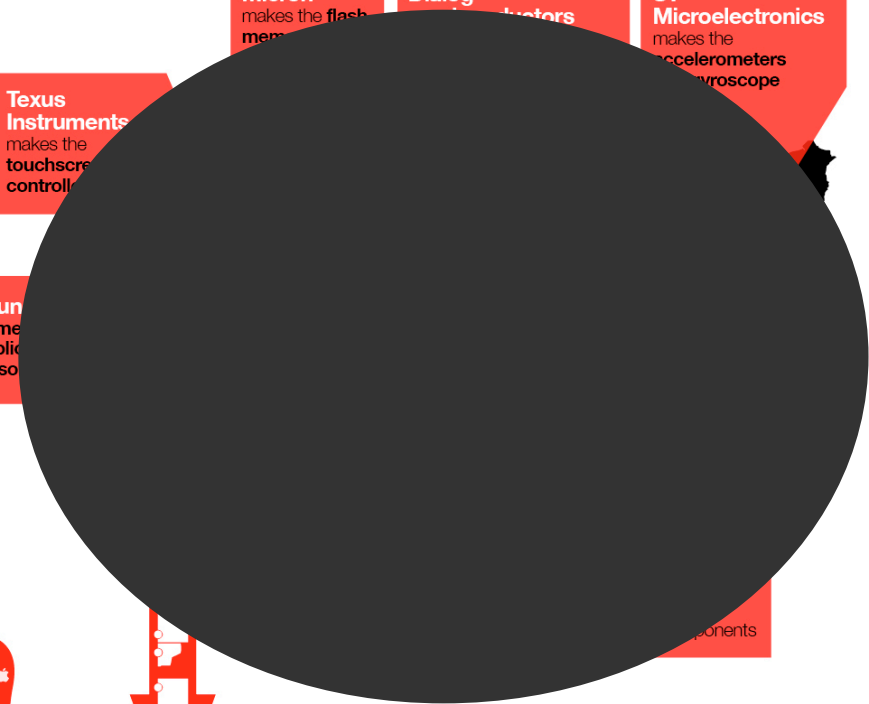
## Samsung

makes memory and application processors

Micron makes the flash memory

Dialog makes the microcontrollers

ST Microelectronics makes the accelerometers and microscopes



# The iPhone supply chain

find out more at [thegatewayonline.com](http://thegatewayonline.com)

the gateway

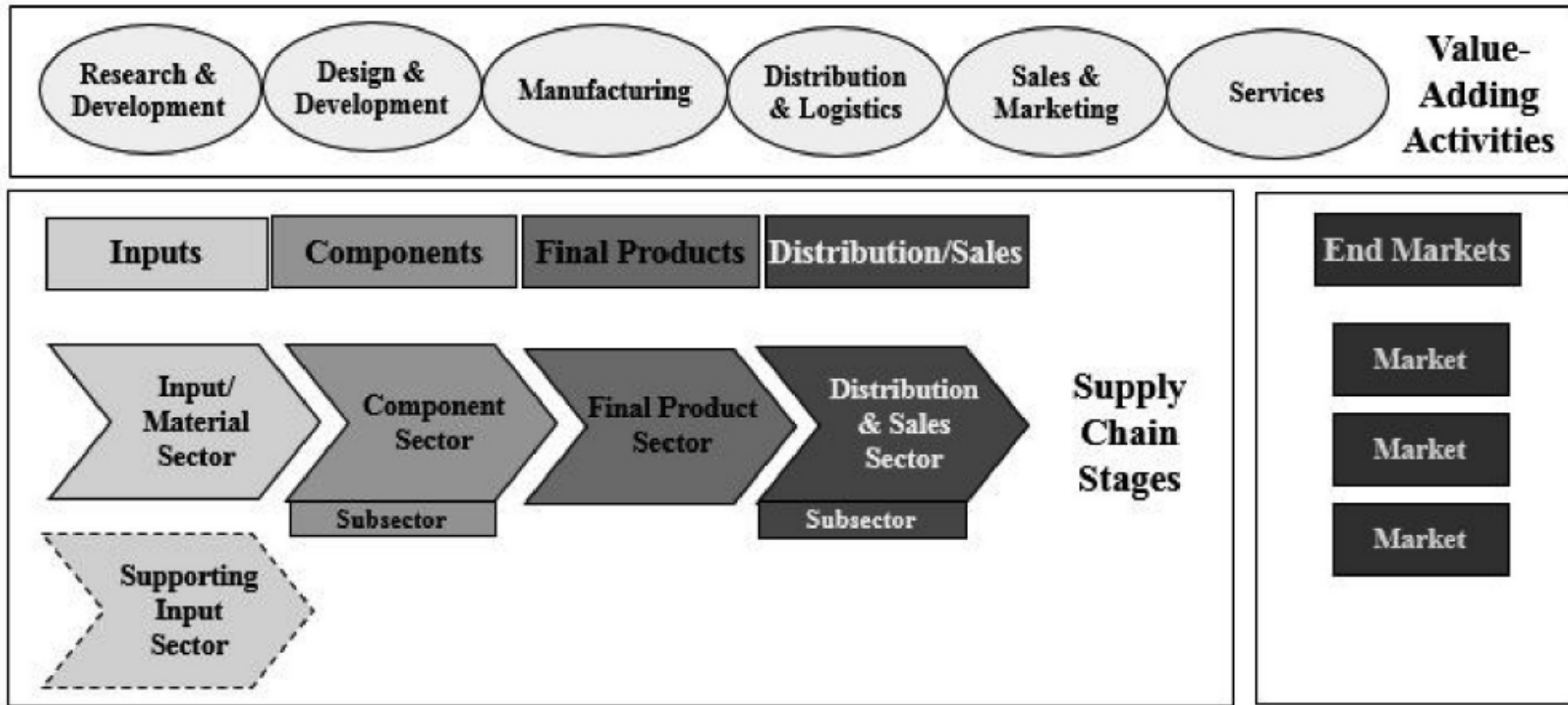


## Shenzhen, China

iPhones are assembled in China by Taiwanese manufacturer Foxconn. As China becomes more economically developed, the rising cost of labour, energy and property could put pressure on Apple's margins.

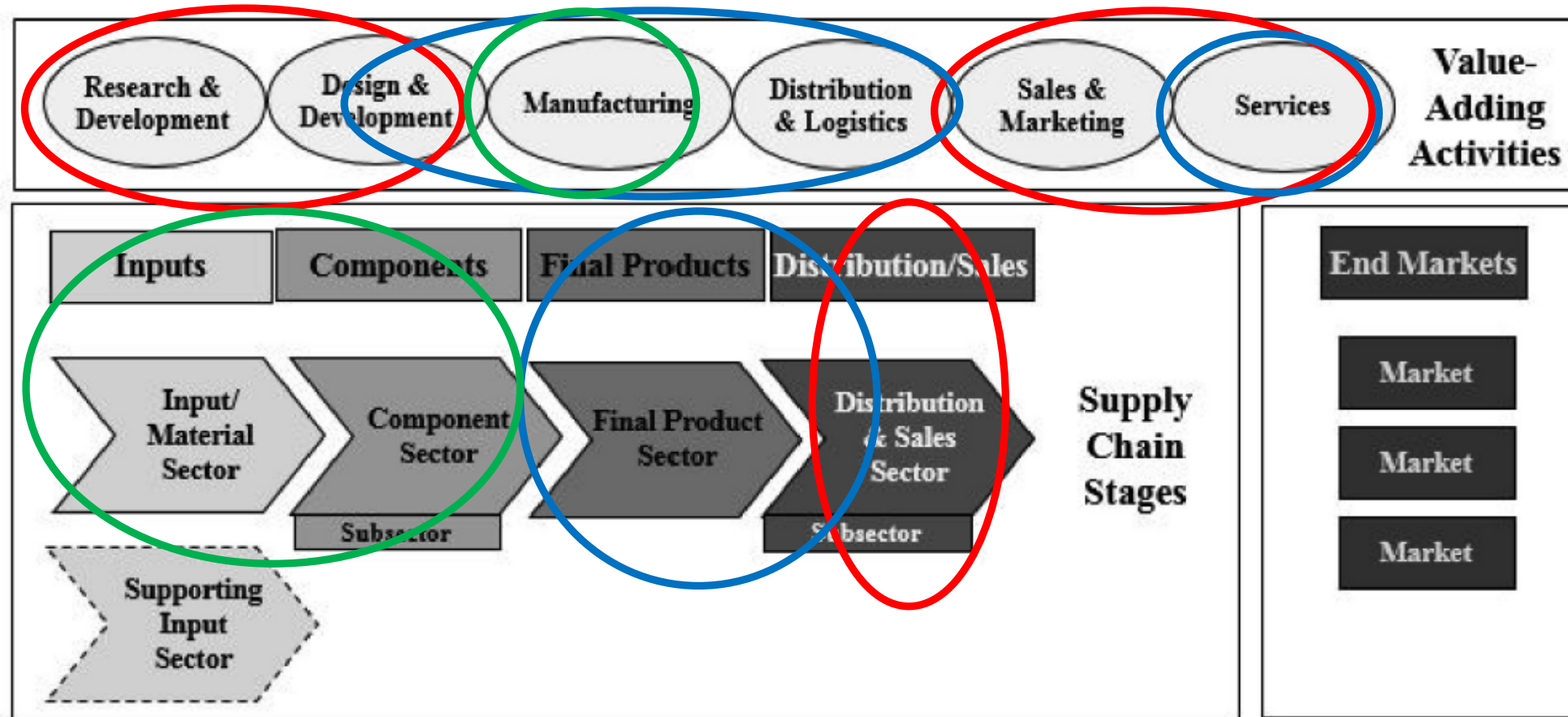


Mapping a global value chain: lead firms (includes brands), first tier suppliers (includes contract manufacturers), lower-tier suppliers



Source: Frederick, S. (2019) Global Value Chain Mapping, in Ponte, S., Gereffi, G. and Raj-Reichert, G. (eds) *Handbook on Global Value Chains*. Edward Elgar.

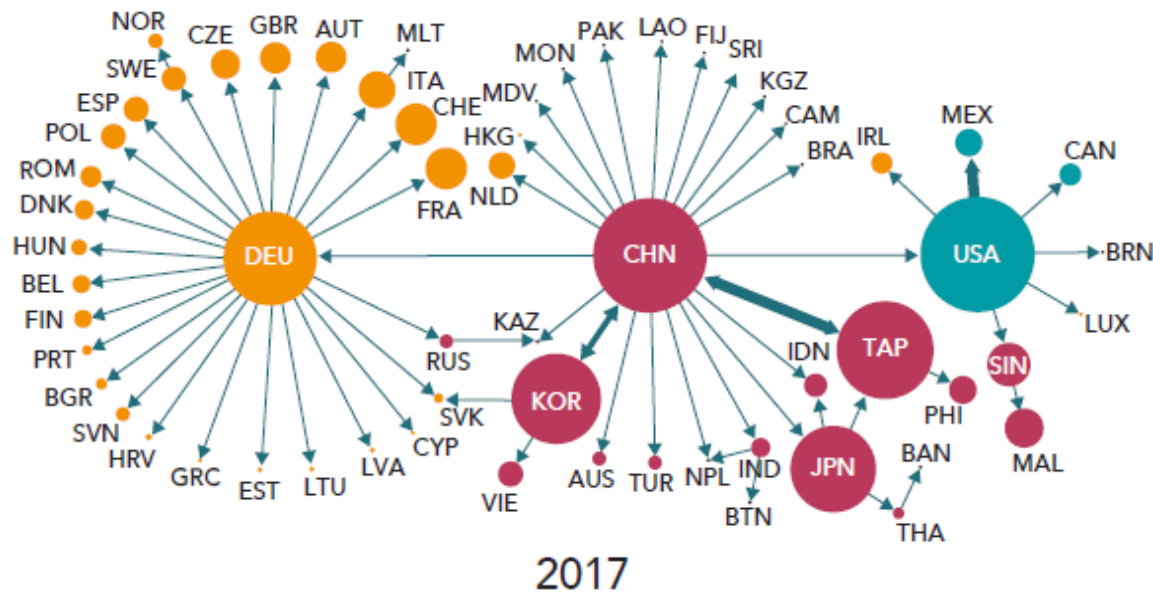
Mapping a global value chain: **lead firms (includes brands)**, **first tier suppliers (includes contract manufacturers)**, **lower-tier suppliers**



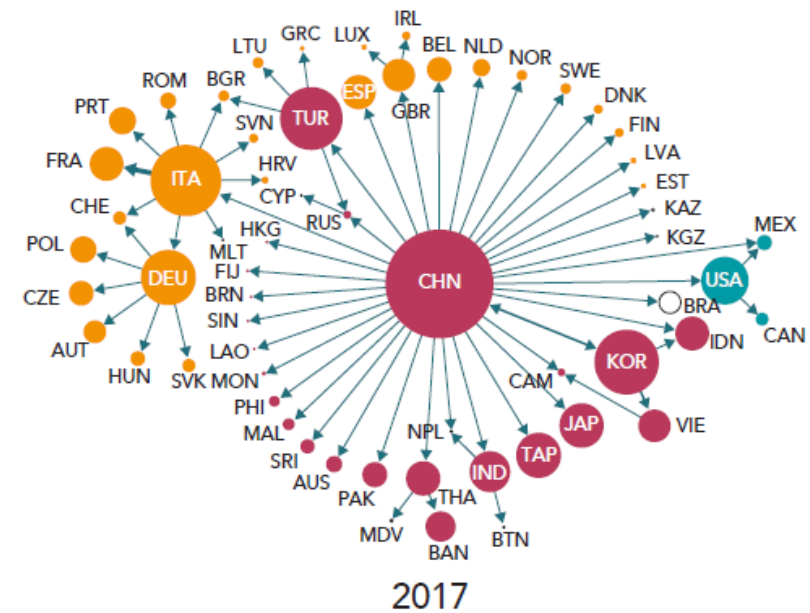
Source: Frederick, S. (2019) Global Value Chain Mapping, in Ponte, S., Gereffi, G. and Raj-Reichert, G. (eds) *Handbook on Global Value Chains*. Edward Elgar.

The electronics industry global value chain (GVC) is one of the more complex and globally fragmented industries

### Electronics






### Textiles



Source: WTO Global Value Chain Report 2019






Note: the size of the circles represents the magnitude of value-added exports. The volume of value-added flow between each pair of trading partners is represented by the thickness of the line linking the two.

## Largest brand or lead firms (US)

	2019 Revenue (USD Millions)	Profit Margin	Employees	Manufacturing Locations (non-exhaustive)
 Apple	260,174	21.24%	137,000	*"Substantially all of the Company's manufacturing is performed in whole or in part by outsourcing partners located primarily in Asia" (SEC 10-K 2019)
 Hewlett Packard Enterprise	29,135	3.6%	61,600	Czech Republic, Mexico, China, Singapore
 Hewlett Packard Inc.	58,756	5.36%	56,000	China, India, Malaysia, Singapore



## Largest brand or lead firms and two of their large contract manufacturers (US)

	2019 Revenue (USD Millions)	Profit Margin	Employees	Manufacturing Locations (non-exhaustive)
 Apple	260,174	21.24% (2019)	137,000	"Substantially all of the Company's manufacturing is performed in whole or in part by outsourcing partners located primarily in Asia."
 Hewlett Packard Enterprise	29,135	3.6% (2019)	61,600	Czech Republic, Mexico, China, Singapore (2M sq feet)
 Hewlett Packard Inc.	58,756	5.36% (2019)	56,000	China, India, Malaysia, Singapore (8.5M sq feet)
 flex	26,210	0.36% (2020)	160,000	Over 100 locations in 30 countries in 5 continent. 81% manufacturing in emerging markets, Brazil, China, Hungary, India, Indonesia, Malaysia, Mexico, Poland, Romania, Ukraine (27M sq feet)
 JABIL	25,280	0.20% (2020)	250,000	Over 100 locations in 31 countries across Asia, Americas, Europe, and Africa. China, Malaysia, Mexico, Singapore, Vietnam, US (53.9M sq feet)

# GVC DYNAMICS: GROWTH OF CONTRACT MANUFACTURERS

- Lead firms and contract manufacturers are in modular GVCs but changing (Raj-Reichert 2019)
- Since 2008 global financial crisis
  - **Lead firms consolidated suppliers**, outsourced and relied more on CMs (partnerships)
  - Hewlett Packard broke into HP Enterprise and HP Company
  - CMs revised business strategies to stay competitive
- Increased **capabilities** into higher value added services
  - supply chain management, logistics, joint design, prototyping, and technological advancements in manufacturing (automation, 3D printing, miniaturization)
- **Diversification** into new industries: automotive, healthcare, aviation and e-commerce
  - Top non-electronics customers for Flex: Ford, Johnson and Johnson, Nike; for Jabil: Amazon; acquired Johnson and Johnson facilities
- Flex's largest acquisitions in the automotive industry - acquired AGM Automotive in 2017, a supplier of automotive interior components and systems, lighting and electronics
- Jabil's largest acquisitions in the healthcare industry - purchased Johnson & Johnson Medical Devices factories in 2019 for over 270 USD million



Jabil factory in Ukraine (automotive, home appliances, telecom)



Flex's Pulse Center monitors its global supply chains



# COVID-19 IMPACT ON LEAD FIRMS

- Initial disruptions were **supply-side constraints**: factory closures in China
- Supply chain disruptions (component shortages) & logistics disruptions (travel restrictions) led to delays & shortages in final products, e.g. iPhone shortages
- Met with **demand-side constraints**: store closures, lockdowns of workplaces, & lost incomes, e.g. fall HP in office computing sales
  - Partially offset by higher sales in home products, e.g. Apple iPads and Macs, HPE servers and cloud data storage services, and HP PCs and notebooks and for healthcare
- Fall in sales and revenues in 1st & 2nd quarters of 2020
- **Recovery** by and around the 3rd quarter

# COVID-19 IMPACT ON CONTRACT MANUFACTURERS

- **Supply-side constraints** due to large production in China and reliance on component suppliers
- Virus and lockdowns/closures spread to other large production locations, e.g. Malaysia and India
- **Costs also** from idle labour and factory under-utilisation, e.g. USD 170 million in pandemic costs for Jabil
  - Re-designing factories/production lines to meet social distancing requirements
- Losses partially offset by sales in **cloud storage** and **healthcare**
- More losses for automotive business as lead firm factories shut-down
- **Revenues** recovered by mid-year with majority of facilities operational

# RECOVERY AND RESTRUCTURING OF GVCS

- **Recovery** (near-term): changes to product mix, online sales
  - Diversification of industries: hedging helped contract manufacturers
- **Resilience** (long-term): about whether just-in-time production is viable
  - Risks from lack of stock-piles, unsubstitutable/unique parts
- Shift towards just-in-case production?
  - Building **redundancy** (suppliers and production locations), reducing unique parts
  - Which suppliers, parts, *and* locations?
- Affects **cost-calculations** differently for lead firms vs contract manufacturers
  - Lowest cost possible GVCs may no longer be only priority; higher prices for resilience/redundancies in supply chains for lead firms
  - Contract manufacturers may deal more with cost for labour, e.g. Jabil to cut 1500 workers including in China saving USD 50 million in costs
- Also, **opportunities** for improved supply chain management by contract manufacturers

# REGIONALISATION OF VALUE CHAINS

- Must consider **both** supply-side & demand-side dynamics
- **Supply-side:** over-dependence on China
- Geopolitics: US-China trade war, US Huawei ban & rising wages/costs are push factors out of China; luring from Covid-19 related industrial policies, e.g. Japan has USD 2 Billion for firms to re/nearshore (Enderwick and Buckley 2020)
  - Shifts to neighboring locations, e.g. Vietnam, for exports into the US (tariff-hopping)
  - Yet, partly remain in China for scale, infrastructure, supplier quality, domestic market
- **Demand-side:** regional value chains linked to regional end markets & nearshoring
  - Will be largely determined by lead firm sales
  - Future of purchasing power of consumers



## ELECTRONIC SALES 2019

Rank	Overall industry sales per country	Overall industry sales per region		HPE per region	Apple iPhones per region	Apple growth in sales	Flex per region	Flex per country
1	United States	Asia Pacific (50% China)		Americas (>10% US, largest per country)	Americas	Americas	Americas (42%)	China (23%)
2	China	Europe		Europe/Middle East/Africa	Europe	Asia Pacific (excluding China)	Asia (39%)	Mexico (18%)
3	Japan	N America		Asia Pacific (including Japan)	Greater China		Europe (19%)	US (15%)

Sources: Frederick and Lee 2019; SEC 10-K Forms 2020

- The **cost** of (further) developing regional value chains may be borne more by contract manufacturers/suppliers
    - Likely outcomes: reducing headcounts, shifting worker-intensive production to lower waged locations, increased automation, bargaining for increased prices, expansion of digital services
  - Regional value chains will face **unequal** factors: availability and quality of suppliers, infrastructure, innovation capabilities, skillsets
    - Depend on economic/health recovery in the Global South (Hulme and Horner 2020)
  - Regional consumption markets: rising middle-income consumers, differences in preferences
  - Regional value chains will have production **hubs** (building on established facilities) **and spokes**. For electronics,
    - In Asia Pacific region, will China remain a hub and/or Vietnam emerging (2 hubs)?
    - For Europe, Poland or Hungary as hub?
    - For the Americas, Mexico as hub?
- will determine winners & losers (countries, suppliers, and workers)

