

Brief number 5: From Semiconductor Cooperation to Competition

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Competition consolidates strong players but at the same time intimidates weaker ones. On the other hand, working together is a clear win that leaves no one at a disadvantage. Thirty years ago, Globetronics, Greatech, Inari, Pentamaster, and Vitrox did not exist. Now they are among the most valuable semiconductor companies in Penang. This success can be traced back to the history of cooperation initiated by Tun Dr. Lim Chong Eu, who invited eight foreign semiconductor companies, namely, Intel, Hewlett-Packard, Agilent, Keysight, Robert Bosch, Advanced Micro Devices (AMD), Hitachi (now Renesas), and National Semiconductors, to establish assembly operations in the 1970s.

These assembly plants formed a successful cluster but gave rise to fierce competition. The highly competitive assembly market forced Intel to diversify into testing and verification services. The specialized equipment and tools necessary for these processes were expensive because they were sourced from foreign vendors. Consequently, Intel decided to outsource its assembly and testing procedures, transferring knowledge of wire bonding, encapsulation, and final testing to local workers through the Penang Skills Development Centre. This strategic move cultivates a reliable pool of local suppliers. In many countries, such as Japan, Korea and Taiwan, champion companies like Sony, Samsung and TSMC build their own eco-system of sub-contractors that are able to supply equipment and specialist services to strengthen their own manufacturing capability.

Globetronics is a success story that demonstrates how two former Intel employees leveraged their cooperative network with Intel to become a major supplier to multinational companies. At the beginning Intel offered a subcontractor opportunity to them, provided them with equipment and facilities, transferred a component of its manufacturing system, and certified quality for their products. Business and bank credits can be obtained easily because its partnership business model with Intel enabled them to develop new engineering skills and services that can serve big technology companies such as AMD, Agilent, STMicroelectronics, Epson, Toshiba, and Spansion. This cooperation model led to several local companies to market the products under their own brand name while owning the intellectual property rights associated with it.

A foreign-local cooperation model encourages interested players to carve out their own niche within the existing supply chain. This often leads to aggressive technology adoption and substantial financial investment and skilled human resources. Slower players may find themselves at risk of being pushed out by stronger players with abundant resources and capabilities. The global consumer electronics market size was valued at US\$724 billion in 2021 and is forecasted to surpass US\$1 trillion by 2030¹. This indicates a strong signal for semiconductor market share and profit battles, and this critically changes the dynamics of cooperation after considering how big gains will be at stake.

Given a strong foreign assembly and testing strength in Penang, anecdotal evidence suggests foreign value creation is higher. Foreign players retain control over high-end technology to protect their R&D investments compared to local counterparts who often receive labor-intensive projects. The findings from Rasiah's (2010) survey confirmed low incidence of Penang semiconductor companies engage in high-level knowledge-intensive activities. However, the trend may be changing because the semiconductor industry employed 560,000 workers and account for RM26 billion or 31% of the total RM83 billion approved

¹ <https://www.precedenceresearch.com/consumer-electronics-market>

investments in 2019. Increasingly, local companies have expanded their revenue and profit base, following the revenue and profit trends of foreign players.

Given Rasiah’s qualitative survey, we decide to extract the corporate accounts of Penang foreign and local players from S&P Capital IQ to compute a first quantitative preliminary study to reveal a simple value calculation (Table 1) to show the difference in performance in terms of revenue and value added between foreign and local players in Penang semiconductor industry. Flex, Jabil, and Plexus are foreign operators utilizing their combined resources and capabilities able to create net value added at an average of RM1 billion while Globetronics, Inari, and Vitrox collectively create net value added at an average of RM421 million from 2019 to 2021. However, we should note that the gross revenue of the foreign players were more than ten times that of the local players, and yet net value added was only double to triple. The local players seem to be able to generate higher net value added relative to gross revenue, compared with their foreign comparators. From 2019 to 2020, value added of the three local companies was around 35% of the total of their foreign comparators, however, there was a significant catch up in 2021 where the local value nearly doubled, reaching half of the foreign value. Since the business models and types of products of the two sets of companies are not identical, it could be that the local companies are in product fields that provided higher value added than the foreign companies.

Table 1 Foreign and Local Value Added

Primary industry: Semiconductor							
MNCs (Plexus, Jabil, Flextronics)				Locals (Vitrox, Inari, Globetronics)			
Generation of value added (in RM mil)	2019	2020	2021	Generation of value added (in RM mil)	2019	2020	2021
Revenue	17,451	19,428	21,368	Revenue	1,709	1,761	2,358
Change in stock				Change in stock			
Value of production	17,451	19,428	21,368	Value of production	1,709	1,761	2,358
Other income				Other income	(83)	(84)	(120)
Gross output	17,451	19,428	21,368	Gross output	1,626	1,677	2,238
Cost of goods sold				Cost of goods sold	1,144	1,175	1,429
Other operating expenditure	16,232	18,053	19,926	Other operating expenditure	130	160	216
Gross value added	1,219	1,375	1,442	Gross value added	352	342	593
Depreciation	246	280	325	Depreciation	8	8	7
Net value added	973	1,095	1,117	Net value added	344	334	586

Source: Author’s own calculation

In the Penang and Kulim cluster, the foreign and local players have fostered an ecosystem of more than 350 multinationals and 4,000 large local corporations (LLCs) and small and medium enterprises (SMEs). Together, this diverse group of players produce up to 13% of global semiconductor testing and packaging. Today, the foreign semiconductor players have market power due to their larger size and global footprint, being able to adapt quickly to market preferences facilitated by substantial reserves of resources and capabilities. The progress of the Penang/Kulim cluster will therefore depend on both competition and cooperation between the big foreign companies and their smaller local companies.

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