

Penang continues to prove its value and resilience

In the last five decades, the state's electrical and electronics (E&E) sector has grown from the first 'eight samurai' to some 350 multinational corporations and more than 3,000 manufacturing-related small and medium enterprises today. Of its competitive advantages, the skilled workforce – now into its second generation of E&E talent – ranks as among the biggest draws for investors, which is why the talent pipeline and continued talent development are a priority for stakeholders.

BY **SREEREMA BANOO**

Penang is often referred to as the Silicon Valley of the East because of its robust electrical and electronics (E&E) industry, which has expanded and evolved since the very first multinational corporations (MNCs) set up their manufacturing facilities in the state back in 1972.

In 2022, Penang's E&E exports totalled RM341.4 million, which is almost three-quarters of total exports from the state and almost 60% of Malaysia's total E&E exports. Penang also contributes an estimated 5% of global semiconductor exports, an industry that is expected to grow to US\$1 trillion by 2030.

With a track record spanning more than five decades, Penang's E&E industry continues to be the preferred investment destination, netting a total of more than RM90 billion from investors between 2018 and 2022. According to the Malaysian Investment Development Authority (Mida), approved manufacturing investments for the state's E&E industry in the first quarter of 2023 stood at RM828.2 million, 40% of the country's total.

Datuk Loo Lee Lian, CEO of InvestPenang – the state's principal investment promotion agency – credits Penang's leadership position to a few factors, particularly the ecosystem developed over the last five decades.

"The breadth and depth of the E&E industry has grown over the 50 years. Penang's workforce with five decades of cumulative intelligence and specialised skills can readily lead and manage local operations as well as oversee offshore plants of MNCs," she says.

"The people have been our most strategic asset. The people in Penang are industrious, forward-thinking and have that culture of working in industry. Today, we have the second generation of people [from Penang] now in the E&E industry, so that perpetuates the intelligence, diligence, discipline and innovation mindset."

Penang's industrialisation journey began in 1972 when the first MNCs established operations in the Penang Free Trade Zone (today known as the Free Industrial Zone). The "eight samurai", as they were known, comprised Intel, HP, Robert Bosch, AMD, Litronix (now ams Osram), Hitachi (now Renesas), Clarion and National Semiconductor (no longer present in Penang following a corporate M&A exercise). These were later followed by other MNCs such as Motorola and Dell.

Today, there are some 350 MNCs and 3,000 manufacturing-related small and medium enterprises (SMEs), the latter playing crucial roles in the ecosystem, particularly in the areas of automated test equipment (ATE), automation, outsourced semiconductor assembly and testing services, electronics manufacturing services, precision engineering and tooling.

Loo says Penang has proved to be very resilient in the face of the growth of other E&E locations in Asia and the region. "Penang has been able to prove its value and resilience and given investors value for their investment in terms of cost, productivity and efficiency."

The expansion of existing MNCs, she points out, is testament to the state's robust industrial ecosystem, well-developed infrastructure, skilled workforce as well as liveability stature.

"These companies have also diversified their operating activities here, moving towards R&D, design and development (D&D) and other high-value-added func-



Loo at an investor construction site meeting

tions. We've moved from very low value and high volume to now low volume and high-value products," says Loo, pointing out that Industry 4.0 technologies including automation are now part of the industry landscape.

Intel, for example, which started with 100 employees assembling memory chips, has 6,000 engineers in design and development today – working on Intel's latest products, from IP design and validation to product development, according to Intel Malaysia vice-president of manufacturing, supply chain and operations/managing director A K Chong.

In recent years, existing MNCs have also expanded their footprint in Penang. In 2021, Intel announced a US\$7 billion investment to increase its manufacturing capacity. The development of new industrial parks such as the Batu Kawan Industrial Park (BKIP) on the mainland has also spurred new investments. For example, TF-AMD Microelectronics is expanding its manufacturing facility with the construction of a second site at BKIP.

The RM2 billion facility is expected to create more than 3,000 jobs in advanced semiconductor engineering, design and process technologies for high-performance computing solutions. In August, Bosch unveiled its new back-end site at BKIP – focusing on final testing of semiconductors and sensors for mobility applications – and plans to invest €350 million (RM1.8 billion) in the site.

The state continues to attract new names, some of whom chose Penang as the site of their first facility outside the US. Recent prominent new investments include

those from Lam Research, Ultra Clean Holdings, Dexcom and Smith+Nephew.

The E&E industry is buoyed by the increasing capabilities of the local companies. Loo says there is a growing number of homegrown companies gaining traction in the global supply chain such as ViTrox, Pentamaster, Greatch and Inari.

"Aside from the manufacturing-related functions, we are seeing an emerging layer of young, fast-growing E&E companies that provide IC (integrated circuit) and IC test design services. These companies

provide services that are crucial in the conceptualisation and product design stages," she says, citing local players such as Oppstar, Experior, Skyechip and Infines Systems, and foreign names like Lattice, StarFive and Efinix.

Growth drivers today

Loo says technology has transformed the types of investments in Penang, adding that its E&E industry's proposition in the global value chain is no longer restricted to back-end operations. It is becoming an emerging hub for IC and IC test design and R&D activities, she says, pointing to the presence of existing R&D and D&D bases of MNCs and fast-growing local companies that provide IC design and IC test design services.

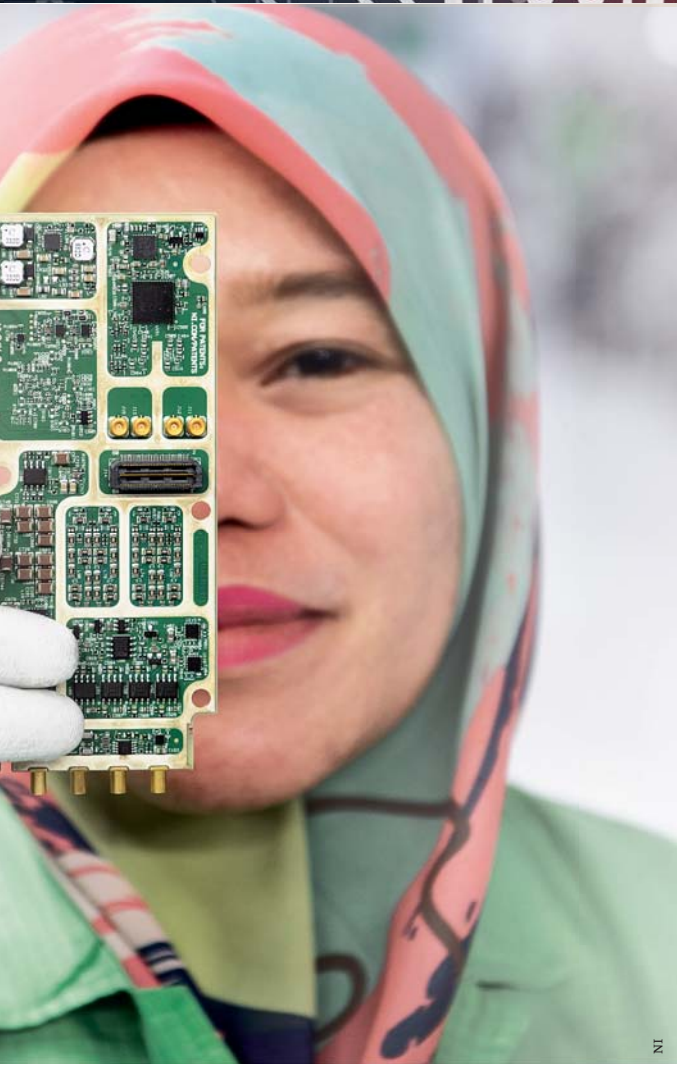
"Penang's capability in equipment and ATE is already at a global standard but our strength is very much in the back-end equipment. With the arrival of Lam Research, we are hopeful that Penang will attract more players along the front-end equipment supply chain to set up operations here."

There are also opportunities in



"The breadth and depth of the E&E industry has grown over the 50 years. Penang's workforce with five decades of cumulative intelligence and specialised skills can readily lead and manage local operations as well as oversee offshore plants of MNCs."

LOO, INVESTPENANG



E&E “spin-off” industries such as medtech and in global business support. “Penang is a pioneer location for offshore medical device manufacturing, which started with B. Braun back in the 1970s,” says Loo.

Although offshore manufacturing for medical devices is not as common as the E&E industry, more and more are coming to Penang, especially given its proximity to fast-growing markets in Asia.

As MNCs consolidate their backroom services, they have found Penang’s multicultural and multilingual talent an asset to their global operations.

“The GBS (global business services) and outsourcing operations are now focusing on high-value activities and knowledge-driven work,” she says, pointing to GlobalFoundries, a multinational semiconductor contract manufacturing and design company that is setting up a new centre of excellence — driven by AI, machine learning and automation — to serve as a hub; monitoring worldwide manufacturing across Singapore, Germany and New York.

Loo believes that Penang, and thus Malaysia, is in a “sweet spot” to capture opportunities stemming from the US-China trade war and supply chain decentralisation, especially with Penang positioning itself as a centre of excellence for the semiconductor industry. Some of these opportunities will come from Taiwan companies expediting their geographical footprint diversification, China’s localisation efforts which require the technical expertise and assistance of non-Western countries, and support for US (including those in the back-end of the value chain) to regain its leadership in the semiconductor industry, she says.

It boils down to talent

Although Malaysia is indeed well poised to benefit and has benefited from the geopolitical factors, there are areas that need to be addressed, chiefly the talent shortage.

Penang Skills Development Centre (PSDC) CEO E T Tan says this was one of the key findings of a survey it conducted earlier this year. “This is a key pain point raised by the industry, especially a shortage of engineers and technicians,” he notes, adding that Penang will need 10,000 talents for its manufacturing sector in the next three years.

The issue of talent in Penang’s manufacturing sector and the E&E industry is not new. Back in 1987, pioneer

companies Intel, HP and Motorola had highlighted the manpower shortage to Penang Development Corp, which eventually led to the establishment of PSDC in 1989, tasked with upskilling the E&E industry’s existing workforce. Since then, the centre has trained almost 257,000 participants through more than 13,000 training programmes, ranging from certificate to diploma and degree courses in precision machining, industrial automation technology, applied engineering and computer engineering, to name a few. The centre also offers short courses on Industry 4.0, operational excellence and digital technology.

More than three decades since it was first raised, the issue of manpower is again in the news. The root of the issue today isn’t in upskilling the talent, says Tan, but rather a lack of them, intensified also by the surge in demand with the entry of new players.

“It is a talent pipeline problem,” he says, pointing to a lack of interest in science, technology, engineering and mathematics (STEM) subjects among the younger generation.

Loo says the issue is exacerbated by the rise of the gig economy, which has resulted in some talents leaving full-time employment and/or school-leavers opting to not pursue tertiary education for the instant gratification the gig economy is said to offer.

But this isn’t Penang’s problem alone. The country lacks an overall human resources blueprint to address the structural issues in the education system, she says. “That children today lack interest in STEM is happening around the world, but what we have is a structural issue.”

Tan concurs, adding that it isn’t just a case of the younger generation’s lack of interest in STEM subjects but that “the education system does not know how to teach science and technology”.

The talent issue is a rising concern among industry players.

“As Malaysia looks towards the future, we need to continue to ensure that the country becomes even more competitive and attractive for businesses to operate here.

We need to grow world-class talent in engineering and the sciences, starting with curricula and exposure at the primary school level to inspire and nurture future generations of innovators. And we must be able to retain our talent because companies are now recruiting internationally,” says Intel’s Chong.

Stakeholders — from the government to industry players — have embarked on several programmes targeting the younger generation. The state government, for example, has been promoting STEM to lower secondary students with the help of state skills enhancement agencies such as PSDC, Penang Science Cluster, Tech Dome Penang and Penang Maths Platform. MNCs such as NI are also leading some of the STEM initiatives like Girls in Engineering and Tech (GET), which it co-created with the Penang Science Cluster in 2019.



“Talent is a key pain point raised by the industry, especially a shortage of engineers and technicians.”

PSDC **TAN, PSDC**



Training participants learning about the pneumatic system during a hands-on lab session at PSDC

“The number of women enrolled in engineering- and STEM-related programmes at universities is small, but it’s a problem that you can’t fix overnight. With GET, where we work with Form Four students, the goal is to increase awareness and motivate them to continue their journey in STEM,” says Selvam Chinappan, vice-president of Asia-Pacific manufacturing at NI and managing director of NI Malaysia.

Collaborating with other MNCs in Penang through boot camps and workshops as well as coaching and mentoring, girls are introduced to engineering.

“We follow them on their journey until they sign up for STEM-related studies,” he says, disclosing that 70% of the pioneer 38 students under the initiative applied for STEM-related degree courses. “Last year, almost 110 students graduated from STEM courses, and this year, we have expanded the programme to the northern region of Malaysia.”

Policies and infrastructure to keep up with the competition

Apart from the talent pipeline, there are some specific skill sets that are acutely needed such as software engineering, says Selvam. As more MNCs locate their global shared services to Penang, the industry is facing a shortage of multilingual talent, especially Japanese and Korean speakers.

Companies are also struggling with issues like water supply, says Selvam, pointing out that water disruption is of great concern to industry players. “Water is fundamental to our operations and so we need to focus on modernising the infrastructure that we have. If you look at the industrial zones in Japan or Germany, for example, they are not dependent on the primary water supply but have a back-up system where each industrial zone has its own reservoir that can accommodate their needs for at least three days in the event of a water disruption. Here, we have industrial zones, but we lack dedicated reservoir tanks for these industries,” he says.

In the area of policymaking, early involvement of the industry is important as it allows companies to predict and budget the impact of these policies, for instance, the minimum wage. Selvam points to the European Union example of progressive wage increases, which allow companies to factor in the increases and minimise disruptions to operations. These concerns are especially acute for SMEs, which is why it is imperative that the government involves industry early. “Make it predictable, have a plan and execute it from that,” he adds.

Intel’s Chong says the E&E and tech sectors are more aggressive and dynamic than ever before.

“Malaysia needs to continue to strive to uphold its competitive edge that stimulates the advancement of strategic industries. Take economic and trade policies. Other countries are aggressively pursuing investments in technology and semiconductors. The US and European Chips Acts are poised to fuel economic growth in those regions.

“We have enjoyed some advantages of having a well-entrenched semiconductor industry here, which makes it attractive for investors. But if policies and infrastructure do not evolve and advance enough to compete with other regions, that advantage can be eclipsed.” ■