

The Malaysian Electrical & Electronics (E&E) Industry – At an Inflexion Point

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ELECTRICAL & ELECTRONICS (E&E) is a major industry of Malaysia, which has grown by leaps and bounds since 1972. The total E&E export for 2012 was RM256.4 billion which represents 36.5% of Malaysia's total exports and 59.3% of total manufacturing exports. The E&E industry employs about 700,000 people of whom 30 to 40 percent are engineers and managers. Meanwhile, foreign direct investments (FDIs) continue to grow while Design & Development (D&D) and business process operations/services have also grown significantly.

However, with over 40 years of experience, the E&E industry has come to a cross road, an inflexion point. How do we position the industry and move forward from here? We are neither cheap nor expensive. Talents are limited. We want to move to high paying jobs and high value added and high tech work. At the same time we must be competitive. Let's take a closer look at these issues concerning the E&E industry since its beginning up to its current progress.

AN OVERVIEW OF THE E&E INDUSTRY

The Beginning of the E&E Industry

1969 has marked a significant milestone in the history of E&E as it is the beginning of the Electrical & Electronics (E&E) Industry in Malaysia. As the Federal Government had revoked the Penang Free Port Status, the unemployment rate at that time was around 15% against the national average of 9%. The Chief Minister at that time, Dr Lim Cheong Eu was faced with this challenge and he needed to find a solution to create more job opportunities. Dr Lim had this vision of setting up some industrial parks, known as the Free Trade Zone (FTZ, now called Free Industrial Zone, FIZ) located in Bayan Lepas, Penang. Subsequently, Dr Lim established the Penang Development Corporation in November 1969 to promote the FTZ and to attract foreign direct investments (FDIs) with pioneer status given. The labour cost was low at that time and this idea of FTZ industrial parks was later extended to other states in Malaysia such as Selangor and Malacca.

Dr Lim and his team made numerous trips overseas especially to USA, Europe and Japan to promote the FTZ and many small medium enterprises (SMEs) came to visit the FTZ. One of the companies was Intel. Andy Grove, then CEO of Intel, visited the location. There was heavy rain the night before. The picture shows that his car was stuck in the mud as the road was not paved and he had to roll up his pants to walk as he visited the site, which basically was still a coconut plantation in the process of being cleared for the use of the industry.

There was a leap of faith when the companies decided to start up their factories in the Penang FTZ in 1972 although the site was not even readied to be used. This decision marked the start of the E&E industry in Penang and in Malaysia. The first eight companies

that came to Penang FTZ were Advanced Micro Devices Products Sdn. Bhd. (AMD), Hewlett Packard Sdn. Bhd. (now called Agilent Technologies), Clarion (M) Sdn. Bhd., National Semiconductor Sdn. Bhd. (now called Fairchild Semiconductor Sdn. Bhd.), Hitachi Semiconductor (M) Sdn. Bhd. (now called Renesas), Intel (M) Sdn. Bhd., Litronix Sdn. Bhd. (now called Osram Opto Semiconductors (M) Sdn. Bhd.) and Robert Bosch (M) Sdn. Bhd. The good news is all of the first eight companies are still around and growing although some were restructured or acquired with company names changed.

THE PROGRESS OF E&E INDUSTRY

The following is an overview on the progress of the E&E industry for the past four decades, namely from the 1970s to 2010s.

In the 1970s

Due to a few key reasons such as low labour cost, availability of good engineers and technicians, competent architects and contractors, as well as a business-friendly government, FDIs were entering into Malaysia since early 1970s. Meanwhile, the support to the new factories from local SMEs (Small Medium Enterprises) had also started to grow.



Subsequently, as the companies gained experience, the local senior managers and engineers who were hungry to learn more and wanted more challenges had decided to convince their top management to transfer the testing responsibilities. The corporate leaders were hesitant to do this as they thought it would be too difficult for the Malaysian engineers. However, with their persistence, the corporate leaders decided to assess the situation and asked if the country had Masters and PhDs graduates in Science and Engineering. The company advertised and more than 100 resumes were received and they were passed on to the corporate leaders for review. The corporate leaders were impressed that Malaysia not only had MSc and PhD graduates from local universities but also from other parts of the world, namely, England, Australia, Japan, Taiwan and a few from the USA.

In the 1980s

Subsequently, since early 1980s, what had started as simple testing facilities had progressed into the state-of-the-art testing as Malaysians continued to demonstrate their capability and competence in handling sophisticated testers which cost more than US\$1 million each. More local senior managers began to replace

the expatriates to head the companies and their operations. As the growth of the E&E industry was getting stronger, there was a need to drive productivity and this led to the start of mechanisation in the factory where local SMEs played an active role and assisted the Multi-National Corporations (MNCs) in improving their productivity through mechanisation such as auto unloaders and auto indexing, while precision tooling had kick-started in which the required tools can be made locally.

Eventually, shortage of manpower and insufficient time to train workers led to the need of outsourcing the manufacturing operations that started the setup of local contract manufacturing which supported the growth of the MNCs. Meanwhile, a wage spiral kicked in as companies headhunted for technicians and engineers. To arrest this problem, the industry, together with the government, proposed the establishment of a non-profit Penang Skill Development Centre (PSDC) to assist with the training of technicians, machinists for the local company and training the direct workers to perform some of the basic technician's tasks, under "The Workforce Transformation" programme which aimed to enhance the knowledge and productivity of workers. The PSDC was set up in 1989, followed by SHRDC (Selangor Human Resource Development Centre) in 1992.

In the 1990s

As the MNCs gained experience, some companies began to set up design and development centres. Malaysian engineers were sent overseas, especially to the USA for training. Semiconductor packaging development, manufacturing process development and design activities kicked in, while the local SMEs were challenged to go for full automation, that is, to develop automated equipment for the MNCs. They took up the challenge and many were successful in developing automated handlers and also for other applications.

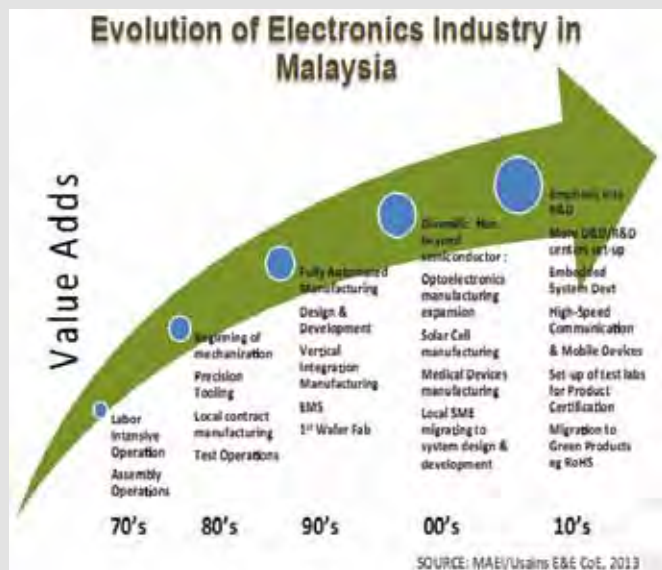


Diagram 1: Evolution of Electronics Industry in Malaysia

In the 2000s

MIDA and the State Governments continue to attract other industries beyond semiconductors. More investments were seen in optoelectronics, medical devices, and solar cells. Also, some existing MNCs started business process operations for Human Resources, Finance, Information Technology, etc. Some of these operations were supporting the region and some worldwide.

Limited profit and loss (P&L) responsibilities were also transferred during this time.

The local contract manufacturing continued to grow to support the MNCs. The SMEs supporting tooling and automation had also gone global to support MNC factories located in other parts of the world such as the Philippines, China and Central America. A few of them became public listed companies. Also, more engineers left the MNCs to become entrepreneurs to set up system design companies.

From 2010 Onwards

Malaysia is no longer viewed as a low-cost country and it is caught in the middle-income trap. Labour-intensive operations are moved out of Malaysia into lower labour cost countries. The factories have moved from high-volume low-mix to high-mix low-volume operations to stay competitive. There is a big drive to go up the value chain into hi-tech, hi-value activities. The government is encouraging more companies to set up D&D (Design & Development) centres or expand the existing design centres, and to set up global procurement centres, regional logistics centres, operational headquarters and other high value operations such as companies with P&L responsibilities. As such, many companies are doing so.

The Challenges in E&E Industry

Referring to Diagram 2 on the evaluation of the E&E Industry relative to the value-added curve, manufacturing has the least value-added while research and market exploration are of the highest value-added. The assessment is that solar cell production is basically at the bottom of the curve with mainly manufacturing, LED is slightly higher up the curve with some design activities, EMS (Electronics Manufacturing Services also known as contract manufacturing) is higher up with design capabilities, supply chain and service support, semiconductor with more design capabilities and product development, and automation with nearly full capabilities from market to design. As you can see, there is a lot more room to move up the value chain.

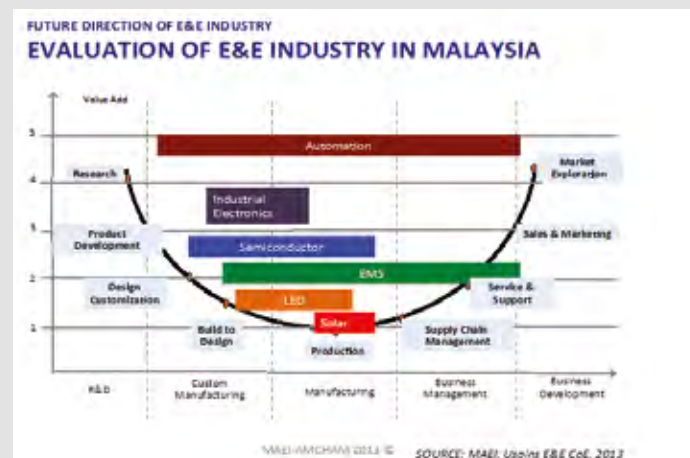


Diagram 2: Evaluation of the E&E Industry in Malaysia

From the 2013 survey of the Malaysian American Electronics Industry members (MAEI), the growth of the D&D is in-line with the direction of the government to go up the value chain. From the graph below, the D&D expenditure has doubled from 2007 of RM1 billion to RM2 billion in 2012. The number of D&D engineers has also more than doubled from about 2,000 in 2007 to 5,500 in 2012.

The key challenge today is talent. We either do not have

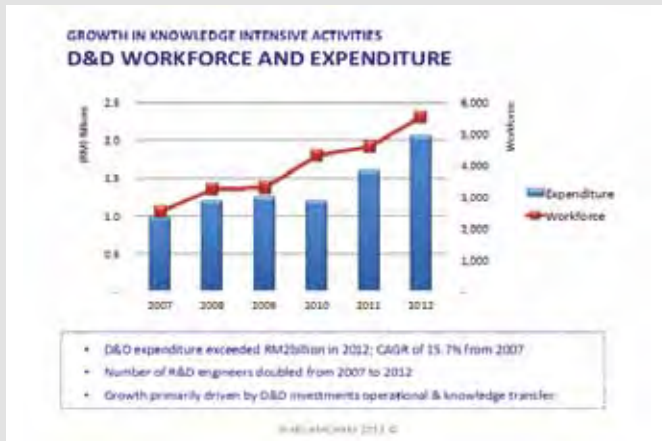


Diagram 3: D&D Workforce and Expenditure

enough experienced engineers and/or the quality of engineers is not good enough. The companies have indicated that they could expand their D&D efforts faster if they could hire more quality and experienced engineers. The education standard needs improvement and English, both written and spoken, has to be improved, as it is an essential business language especially in the E&E industry as most manuals, specifications, meetings, equipment with interactive features are all in English.

The other challenge is to build the eco-system. With more D&D work being done, the companies are looking for capable local companies that can take on engineering challenges as they would like to outsource some of the D&D work. Such capability needs to be further developed.

Future Direction of the E&E Industry

In terms of talent development, the government has taken the inputs of the industry into account. They are encouraging more scientists and engineers to study Masters and Doctorates through MyMSc and MyPhD programmes. The Northern Corridor Implementation Authority (NCIA) has set up the Centre of Excellence (CoE) for Microelectronics operated by USAINS Infotech Sdn. Bhd. At this E&E CoE, talents are being trained for microelectronic design. There is an MSc programme with the Universiti Sains Malaysia (USM) and the first batch of MSc in Electronics Engineering has graduated. It is also providing design engineering services to the MNCs. Furthermore, there is Talent Corp attracting talents back to Malaysia. As for expatriate talents, it is easier now to get



Diagram 4: Strengthen Talent Pipeline through Education

employment permits and many of them are given residential pass valid for 10 years.

Strengthening the Talent Pipeline through Education

However, the above will take time and it is still not sufficient to support the industry now and in the future. Diagram 4 shows more work need to be done in the area of education. We need to provide quality education from primary to secondary. The university standards need to be improved. The command of the English language is important and must be improved. Last but not least, we need to encourage more students to study science and engineering as the number of students studying these two subjects has decreased from more than 60% to currently at around 30%.

Establishing a Strategic Council for E&E Industry

There is also a need to establish a strategic council that will consist of mainly experienced leaders from the E&E industry working with the government to develop strategies and directions for the industry. This will be a joint public-private driven effort focusing on strategic areas. The programmes will be supported for a longer-term implementation. It will set goals and it will also look at streamlining the government funding. One of the goals could be becoming a top 10 design centre in the world and the said council ought to think about what will it take to achieve such a goal.



Diagram 5: Set Up a Strategic Council for E&E Industry

Building the Eco-Systems

Even though Malaysia has had more than 40 years of experience in the E&E industry, we have missed building the eco-system for the semiconductor sector. However, we have the opportunity now to build the eco-systems that are needed for green technology, LED, solar, embedded systems and bio-medical devices.

Nurture More Local SMEs to be Global Companies with International Brands

There needs to be some strategic programmes to assist local SMEs to grow and compete globally. The assistance could be in areas of technology acquisition, product commercialisation, funding where necessary, branding and setting up global networks and business connections. On the other hand, we need SMEs that are hungry enough and have the passion to innovate and want to be recognised global players. Malaysia still has this dream that one day one of the local companies will establish a globally recognised brand such as Samsung, Apple or Nokia. ■