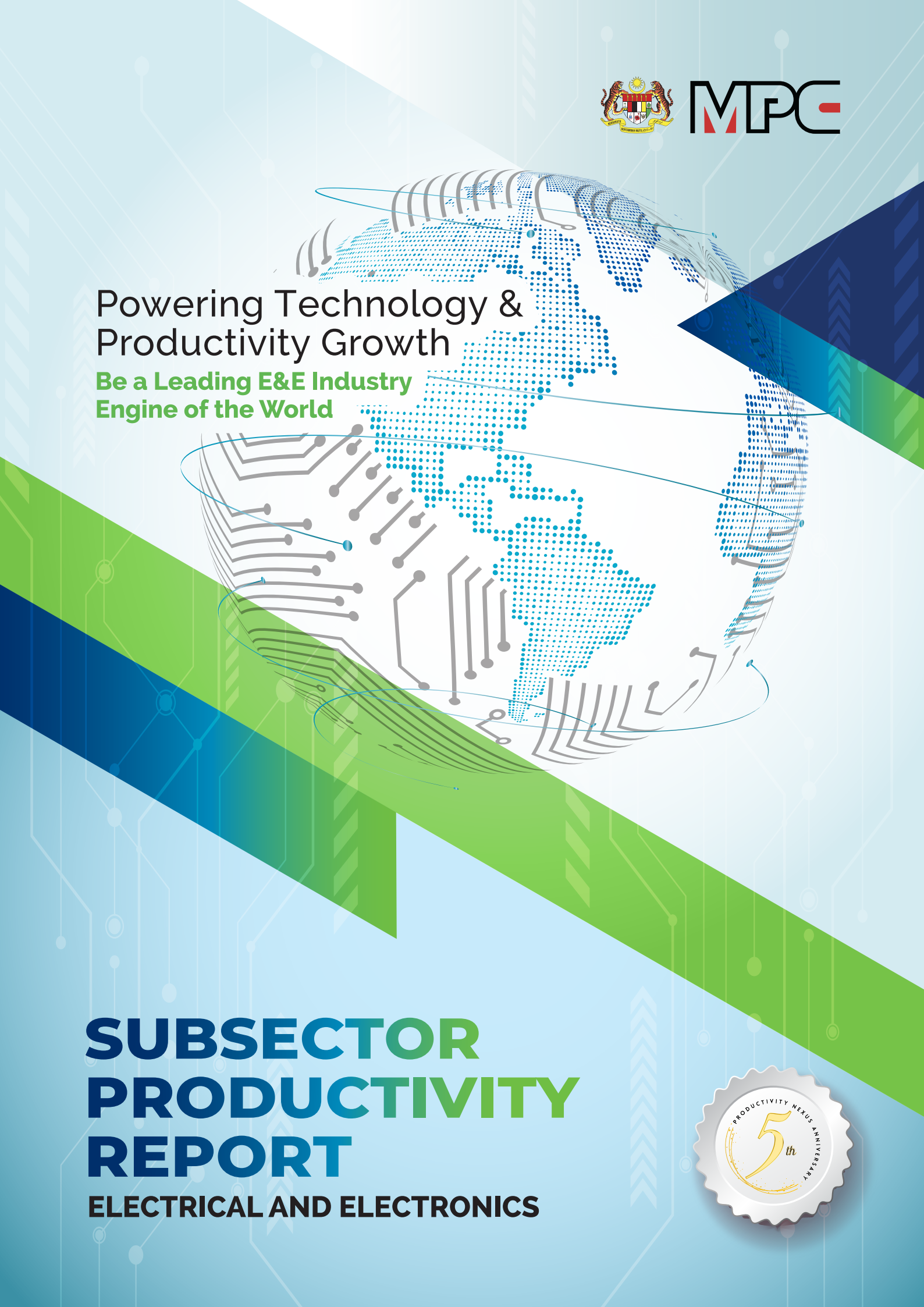
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Be a Leading E&E Industry
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SUBSECTOR
PRODUCTIVITY
REPORT
ELECTRICAL AND ELECTRONICS
PRODUCTIVITY NEXUS ANNIVERSARY
5th

EEPN

ELECTRICAL AND ELECTRONICS
PRODUCTIVITY NEXUS

SUBSECTOR PRODUCTIVITY REPORT

ELECTRICAL AND ELECTRONICS

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Subsector Productivity Report Electrical and Electronics

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Malaysia Productivity Corporation

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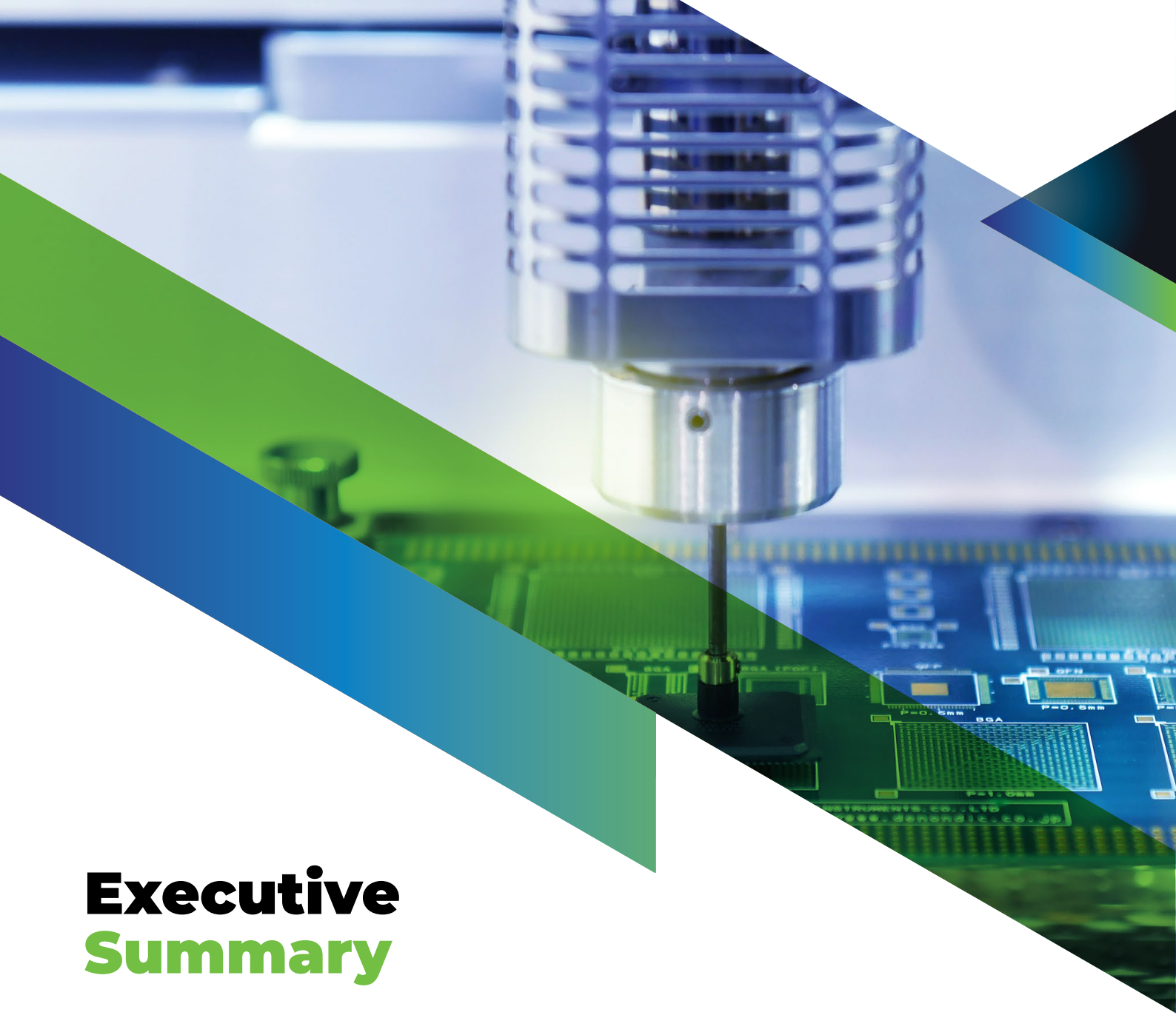
Table of Contents



Executive Summary

The electrical and electronics (E&E) subsector is a major contributor to Malaysia's economy and the largest export product. This report details Electrical and Electronics Productivity Nexus (EEPN)'s initiatives and programmes to boost the productivity of the subsector by impacting growth at the sectoral and enterprise level.

The first part of the report introduces Malaysia's E&E subsector, focusing on its contribution to Malaysia's economy, labour productivity growth, employment, and exports.

The second part focuses on EEPN's initiatives to facilitate E&E enterprises' growth and manage challenges in the subsector. Recommendations to bring the E&E subsector to a higher level are presented, including the highlights of EEPN's high-impact programmes. The highlights detail EEPN's initiatives in creating value for the Industrial Revolution 4.0 (IR4.0) ecosystem through Plugfest Workshops Series; strengthening and supporting the Malaysian E&E subsector through Structural Industry Apprentice Programme (SIAP) for IC Design; enhancing symbiosis within the subsector; addressing concerns of the E&E subsector via E&E Forum; and facilitating E&E companies on the road to recovery.

Statement from the Senior Minister and Minister of International Trade and Industry

"Malaysia's policy direction is towards accelerating value chain advancement through the strategic adoption of advanced technologies and efficient production of new sophisticated products"

The Ministry of International Trade and Industry (MITI) and its agencies are committed to fast-tracking Malaysia's economic recovery, growth, and sustainability. Enabling a more robust manufacturing sector will hasten the process, given the sector's crucial contribution to the country's economy.

In 2021, the manufacturing sector's annual economic growth grew to 9.5 per cent, the highest among other main sectors. It attracted the highest approved investment in 2021, with 702 projects worth RM195.1 billion. While other sectors are still performing below the pre-pandemic level, most industries in the manufacturing sector have surpassed their 2019 performance. This forecasts solid and robust growth in the years to come.

The Electrical and Electronics (E&E), Chemicals and Chemical products (C&C), and Machinery and Equipment (M&E) subsectors are the most vital contributors to Malaysia's manufacturing sector. The subsectors recorded an impressive productivity growth in 2021 – E&E at 12 per cent, C&C at 10.1 per cent, and M&E at 9.0 per cent, the highest among the priority economic areas under MPC's nine Productivity Nexus.

I congratulate Malaysia Productivity Corporation (MPC) on publishing the 5-year subsectoral reports for the three main subsectors under the manufacturing sector. These reports detail the journey of the E&E, C&C, and M&E subsectors from 2017 to 2021, and with them are the lessons for future growth.

YB Dato' Seri Mohamed Azmin Ali
Senior Minister and
Minister of International Trade and Industry

Message from the Director General, Malaysia Productivity Corporation

"Given the Government's focus on the electrical and electronics (E&E) subsector, Malaysia Productivity Corporation (MPC) through Electrical and Electronics Productivity Nexus (EEPN) will strengthen efforts to boost the productivity of the subsector"

In the face of the pandemic, the global E&E market registered an estimated value of USD3055.3 billion in 2020. E&E products are Malaysia's largest export, and the country continues to solidify its position as one of the major E&E exporters.

Malaysia's E&E subsector has evolved progressively, implying the growth in productivity, production, and performance. Since the 1970s, when Malaysia ventured into simple electrical and electronic components, semiconductor parts assembly, and semi knocked-down electrical products, the subsector has produced 8 per cent of global back-end semiconductor output. The future is bright for the subsector, and the Government is setting a solid plan to heighten the E&E subsector towards high value-added and sophisticated products, automation, and digitalised operation.

This is already happening fast against the economic landscape. Supportive Government policies on IR4.0, digitalisation and advanced technology will catalyse faster growth.

EEPN will strengthen the current initiatives and plot a new direction for future programmes to facilitate the E&E subsector at the sectoral and enterprise level. The Twelfth Malaysia Plan will guide EEPN productivity initiatives as the subsector is positioned to impact the national economy more in the next five years.

Dato' Abdul Latif bin Haji Abu Seman
Director General
Malaysia Productivity Corporation (MPC)

Statement from the Champion, Electrical and Electronics Productivity Nexus

"The Twelfth Malaysia Plan (12MP) has identified the electrical and electronics (E&E) subsector as one of the strategic and high impact industries. More focus will be given to accelerating growth in this subsector. The industry welcomes the Government's attention to the country's E&E subsector and pledges to work hand-in-hand to realise the projection"

The outlook for the E&E subsector in Malaysia is very promising with the rising global demands for E&E products.

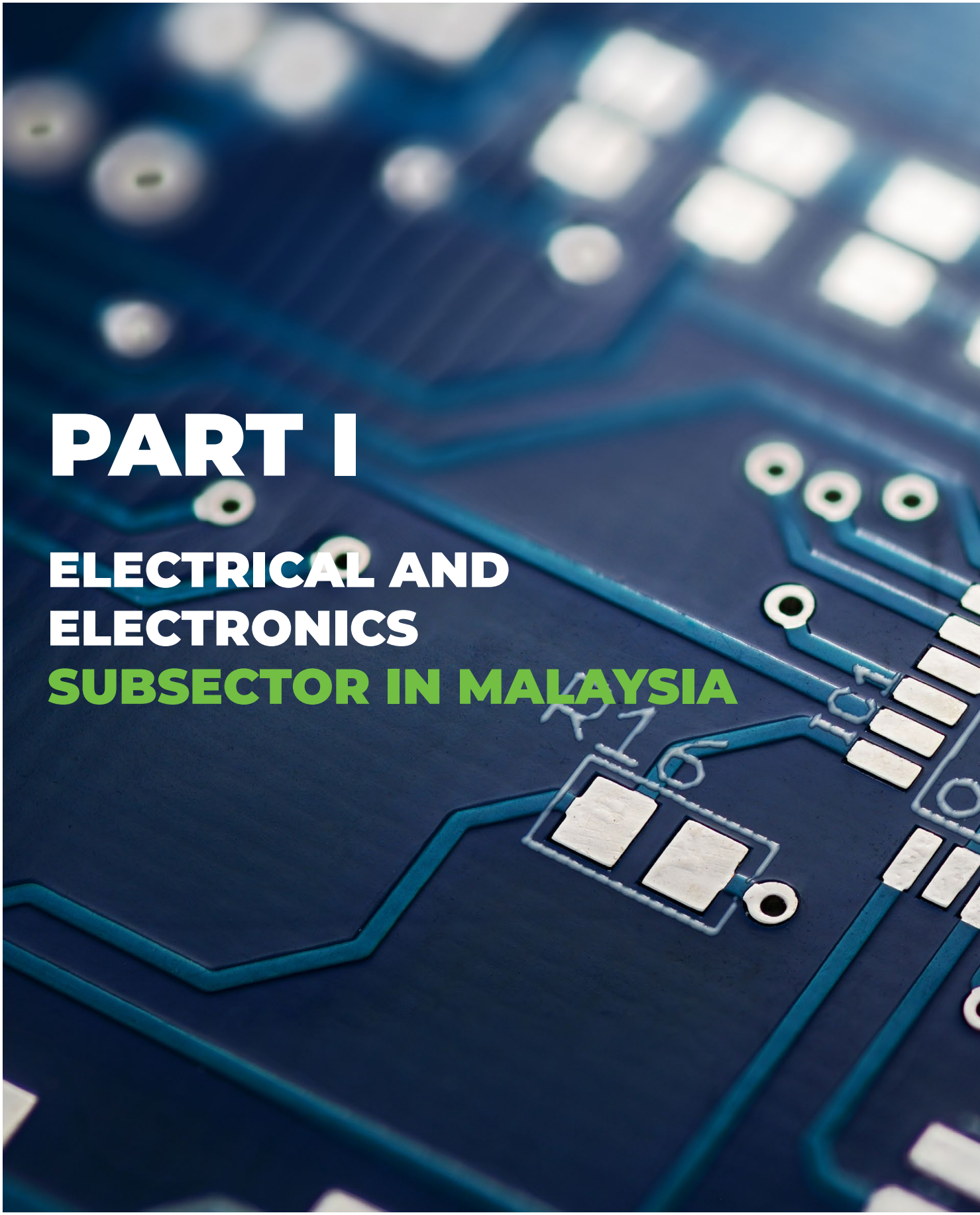
Despite the impact of the pandemic, the E&E subsector contributed RM455.73 billion (36.8%) to Malaysia's total exports, an increase of 18 per cent year on year from 2020, valued at RM386 billion. The number denoted a positive trajectory of the E&E subsector globally and domestically. For Malaysia, the rising demand means a massive opportunity for the country to strengthen its position as the leading manufacturer of E&E products. Nevertheless, the subsector is not operating at its maximum capacity implying an opportunity lost for the country and specifically the E&E industry players. The current situation is still challenging for businesses to operate seamlessly.

Hiring local workers is among the biggest challenges faced by Malaysia's E&E subsector. As human capital is the asset to productivity growth, the lack of local workers and talents in the E&E subsector may impact the growth in the long run. This is not a new challenge, yet somehow the pandemic has worsened the situation. Many countries around the world also face this problem.

I call upon the industry players to pull their brains and minds together to manage the barriers we face in our industry, most importantly, bring the industry to a new height as envisioned in the 12MP.

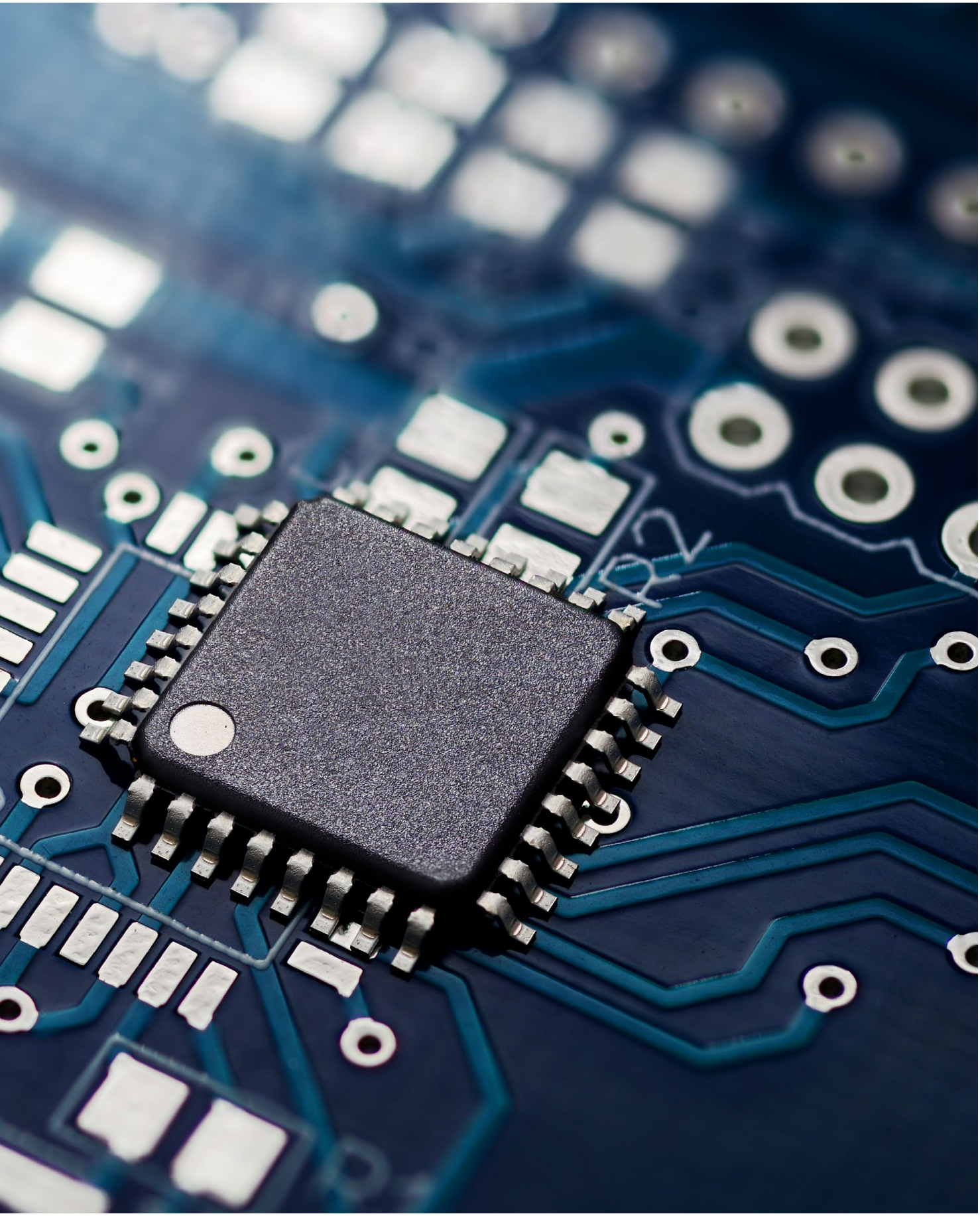
At EEPN, the Nexus pledges the commitment and hard work to affect changes in the E&E subsector.

Dato' Seri Wong Siew Hai
Champion
Electrical and Electronics Productivity Nexus (EEPN)



PART I

ELECTRICAL AND ELECTRONICS SUBSECTOR IN MALAYSIA



ELECTRICAL AND ELECTRONICS SUBSECTOR IN MALAYSIA

AN OVERVIEW

The Electrical and Electronics (E&E) subsector has significantly contributed to Malaysia's economy. The E&E products have been among Malaysia's main exports, with export destinations including China, the US, Singapore, Japan, and Hong Kong. The E&E subsector is the mainstay of Malaysia's economy and remains strong and resilient amidst the impact of the COVID-19 pandemic. The subsector continues to grow and is identified as one of the significant high-impact industries in the Twelfth Malaysia Plan (12MP).

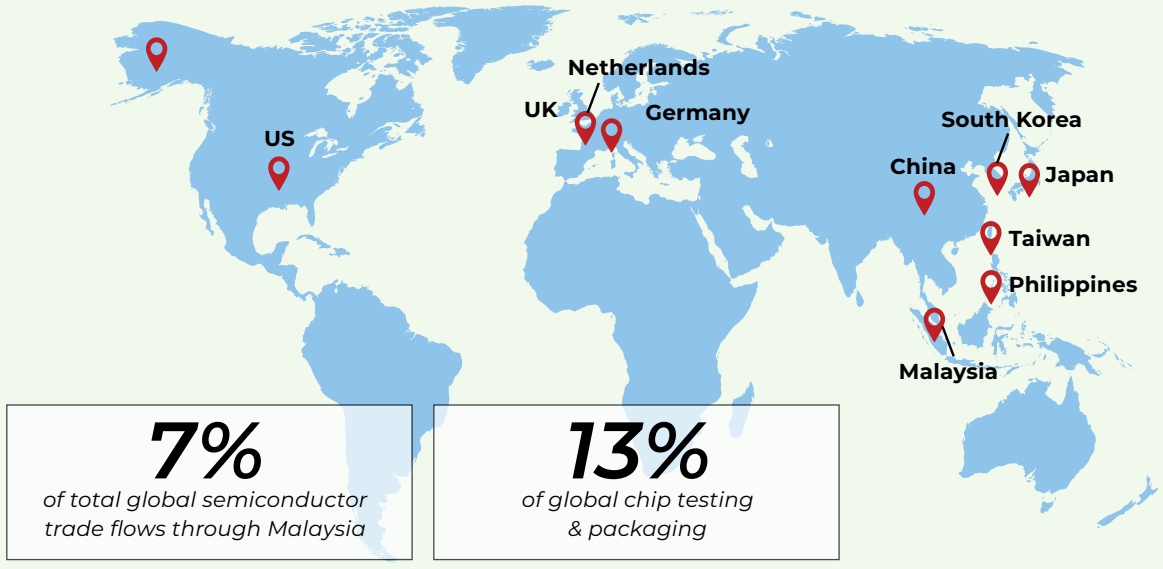
Malaysia's E&E subsector has a vast potential to cater to global E&E demand, especially for the semiconductor market. The global semiconductor industry is expected to expand by 26 per cent in 2021. It is projected to grow by 11 per cent in 2022, based on the data collected by Global Semiconductor Trade Statistics. The rising demands present a window of opportunity for Malaysia to strengthen its role in the E&E global value chain.

The subcategories of the E&E subsector include :

i. IC and System design and development
ii. Semiconductor front end and wafer fabrications
iii. Assembly, test, packaging, and outsource assembly and test services (OSAT)
iv. Electronics manufacturing services (EMS)
v. Photovoltaic and renewable energy
vi. Equipment automation and mechanisation
vii. Electronic healthcare and medical devices
viii. IR4.0 and system integrators
ix. Transportation electronic systems
x. LEDs, optics and photonics
xi. Memory storage systems
xii. Electronics connectors, cables and interconnects
xiii. Communication systems (RF, 5G, Microwaves and wireless)

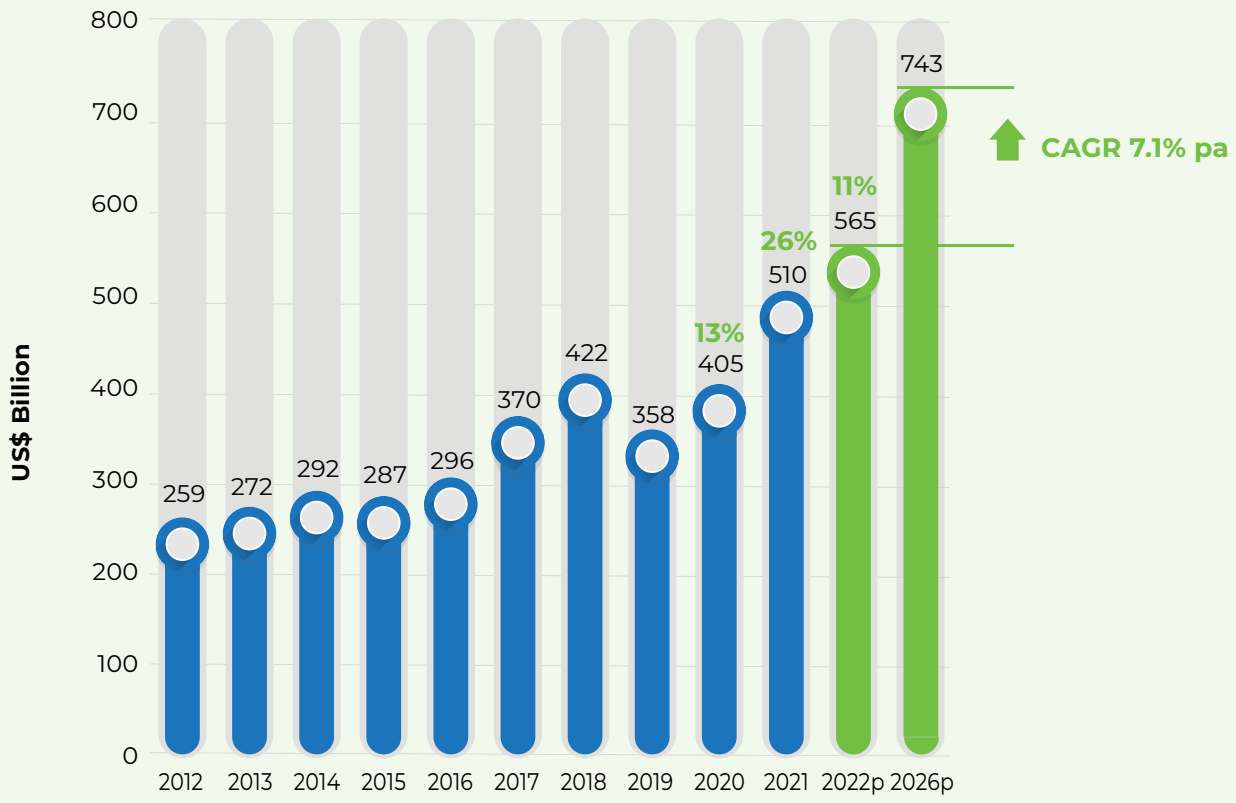
E&E IN GLOBAL SCENARIO

Figure 1 : Malaysia is a Key Player in the Global Semiconductor Supply Chain



Source: Made in the USA: Revitalizing the Domestic Semiconductor Industry, BelferCenter for Science and International Affairs, Harvard Kennedy School (2020), UN Comtrade (2019 Data)
DOSM & MATRADE (2021)

Figure 2 : Worldwide Semiconductor Market



Source: IC Insights (Feb 2022)

The chart above shows Malaysia's position within the global semiconductor supply chain. 7 per cent of total global semiconductor trade flows through Malaysia, and the country contributes 13 per cent of global chip testing and packaging.

Accelerated by the COVID-19 pandemic, increasing demand for digitalisation drives up the global semiconductor industry revenue. However, it leads to a worldwide chip shortage that impacts the industry's supply chain. The worldwide semiconductor market is expected to grow at 7.1 per cent per annum in CAGR.

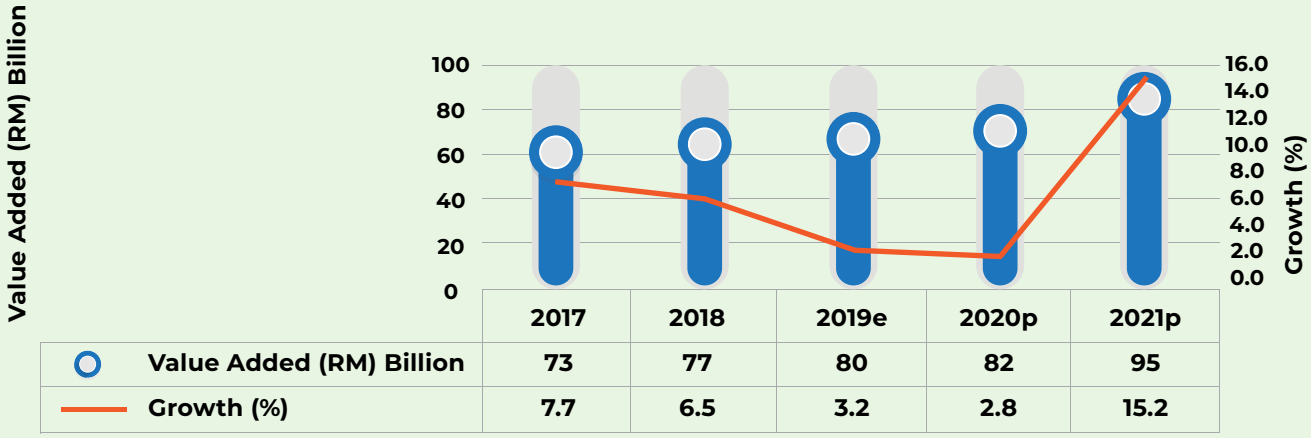
The E&E subsector is the mainstay of Malaysia's economy and remains strong and resilient amidst the impact of the COVID-19 pandemic. The subsector continues to grow and is identified as one of the significant high-impact industries in the Twelfth Malaysia Plan (12MP)

CONTRIBUTION TO MALAYSIA'S ECONOMY

From 2016 to 2020, the E&E subsector grew at 5.6 per cent per annum, slightly higher than the manufacturing sector growth of 3.3 per cent per annum. In 2021, the E&E subsector contributed 6.85 per cent to GDP, valued at RM95 billion. In addition, the E&E subsector dominated the country's exports, with total exports accounting for 36.8 per cent or RM455.73 billion in 2021. The E&E subsector received the most investment opportunities, with 94 approved projects worth RM148 billion from the manufacturing sector's secured projects worth RM195.1 billion in 2021.

In 12MP, under the critical focus on accelerating the development of strategic and high impact industries, Malaysia targets RM120 billion contribution to GDP by the E&E subsector by 2025. The E&E export in 1972 was only RM230 million. Last year, E&E export was RM456 billion, 36.8% of Malaysia's total exports. The growth from 1972 to 2022 is a compounded annual growth rate of 16%. This is equivalent to Malaysia's E&E exports doubling every 5 years and 12MP targets RM495 million in export value of E&E products by 2025 surely achievable. This is an impressive performance by the E&E industry in Malaysia.

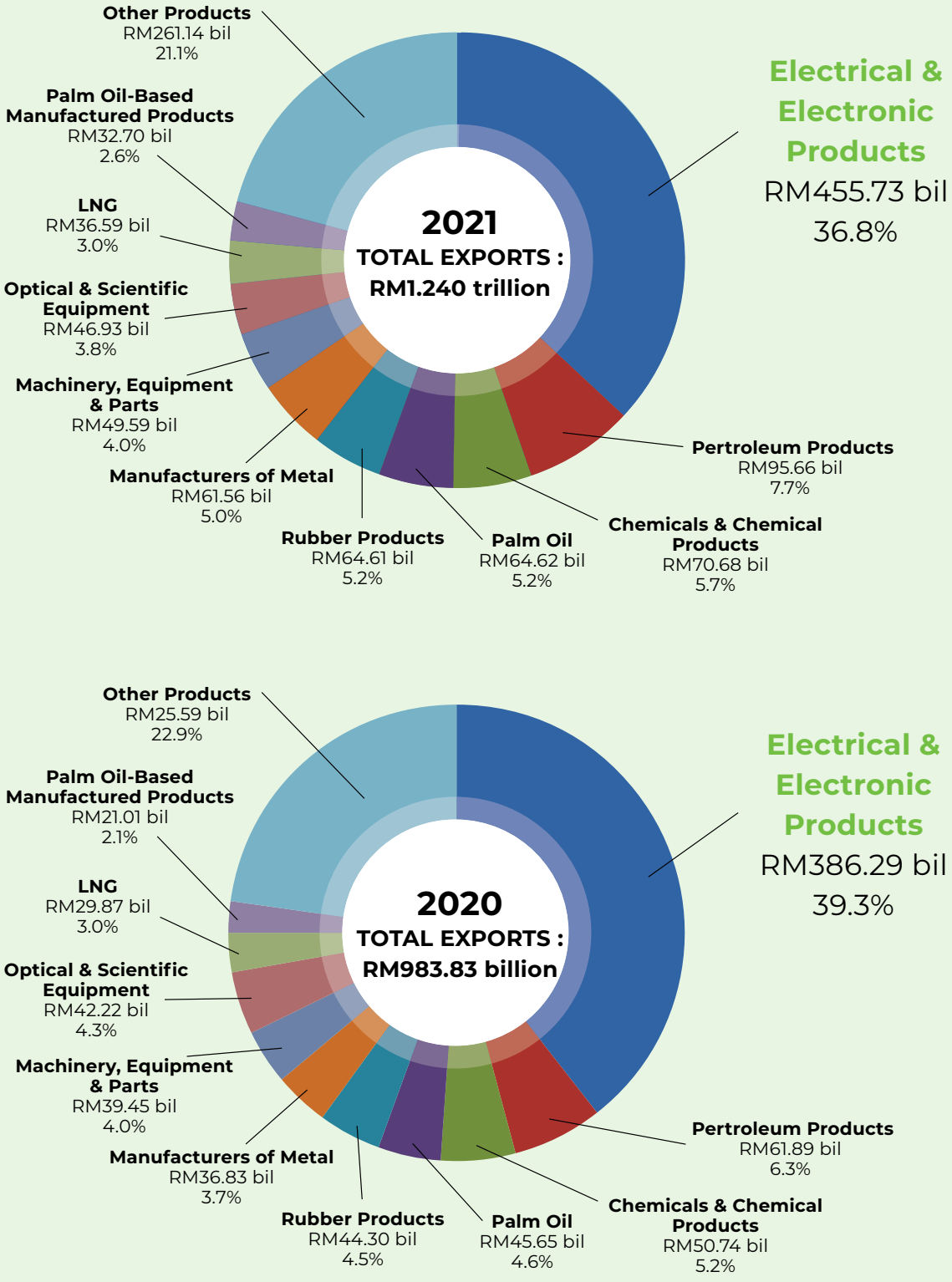
Figure 3 : Electrical and Electronics Subsector Value Added from 2017 - 2021



	2017	2018	2019e	2020p	2021p
Value Added (RM) Billion	73	77	80	82	95
Growth (%)	7.7	6.5	3.2	2.8	15.2

Source: Department of Statistics Malaysia (DOSM)

Figure 4 : Malaysia's Exports in 2020 - 2021



Source: Department of Statistics, Malaysia (DOSM, tabulated by MATRADE

LABOUR PRODUCTIVITY OF THE ELECTRICAL AND ELECTRONICS SUBSECTOR IN MALAYSIA

Table 1 : Labour Productivity Growth for Main Economic Subsectors 2017 - 2020

Sector	Subsector[1]	RM '000 per Worker, at Constant 2015 Prices		Average Annual Growth Rate, %
		2017	2020	2018-2020
Agriculture	Agrofood	89.2	91.9	1.0
Manufacturing	Chemicals and Chemical Products	291.1	276.8	-1.7
	Machinery and Equipment	84.5	86.2	0.7
	Electrical and Electronics	164.8	177.4	2.5
Services	Retail and Food & Beveranges	44.4	42.7	-1.3
	Tourism	66.9	37.3	-17.7
	ICT Services	339.2	367.3	2.7
	Professional Services	76.9	78.0	0.5
	Private Healthcare	61.3	59.1	-1.3
	Overall	82.7	82.3	-0.2

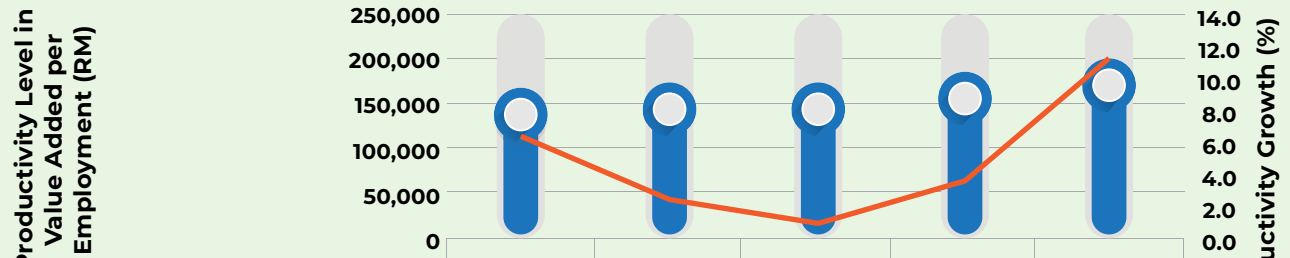
Source: Twelfth Malaysia Plan (12MP)

The E&E subsector recorded an impressive labour productivity growth in 2021 at 12 per cent, with RM198,439 in value added per employment. The growth was the highest among the subsectors under the Productivity Nexus. The high demand for E&E products worldwide, specifically in the semiconductor market, contributed to the increase (Figure 5).

The E&E subsector's productivity performance in value added per hour worked registered a consistent increase over the five years from 2017 to 2021. In 2021, the subsector recorded RM85.50 per hour worked, increasing from RM81.00 per hour worked in 2020 (Figure 6).

The E&E subsector recorded an impressive labour productivity growth in 2021 at 12 per cent, with RM198,439 in value added per employment.

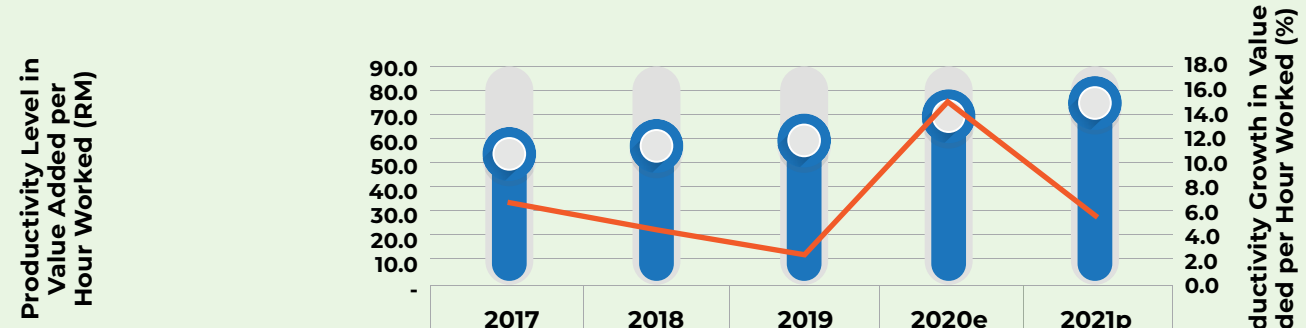
Figure 5 : Productivity Performance of the Electrical and Electronics Subsector in Value Added per Employment 2017 - 2021



	2017	2018	2019	2020e	2021p
Productivity Level in Value Added per Employment (RM)	163,835	168,258	170,471	177,211	198,439
Productivity Growth (%)	6.6	2.7	1.3	4.0	12.0

Source: Department of Statistics Malaysia (DOSM)

Figure 6 : Productivity Performance of the Electrical and Electronics Subsector in Value Added per Hour Worked 2017 - 2021



	2017	2018	2019	2020e	2021p
Productivity Level in Value Added per Hour Worked (RM)	65.3	68.0	69.9	81.0	85.5
Productivity Growth (%)	6.8	4.2	2.8	15.9	5.6

Source: Department of Statistics Malaysia (DOSM)

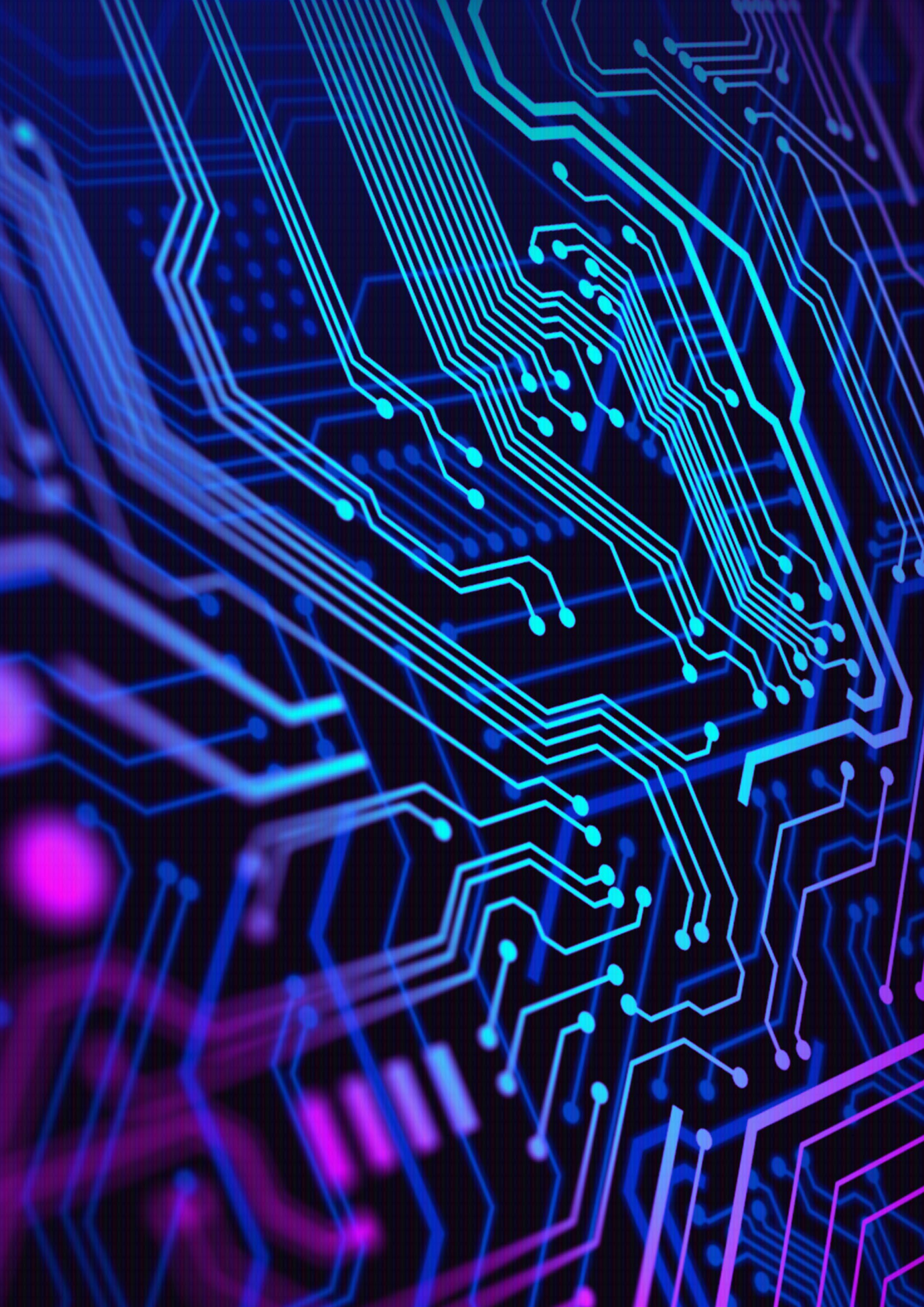
EMPLOYMENT

The total workforce in the E&E industry is 590,000, 3.8 per cent of total employment in 2021, as indicated by the Malaysia Semiconductor Industry Association (MSIA) and the Department of Statistics Malaysia (DOSM). There was no significant increase in employment from 2019 to 2020, consistent with the stagnation of the E&E workforce. Nevertheless, there was a sharp rebound in employment in 2021. The industry is still facing the challenge of hiring and retaining workers, impacting the industry's ability to cater for the E&E global demand.

MSIC Code – Listed in the table below are the MSIC codes for the E&E subsector as sourced from DOSM.

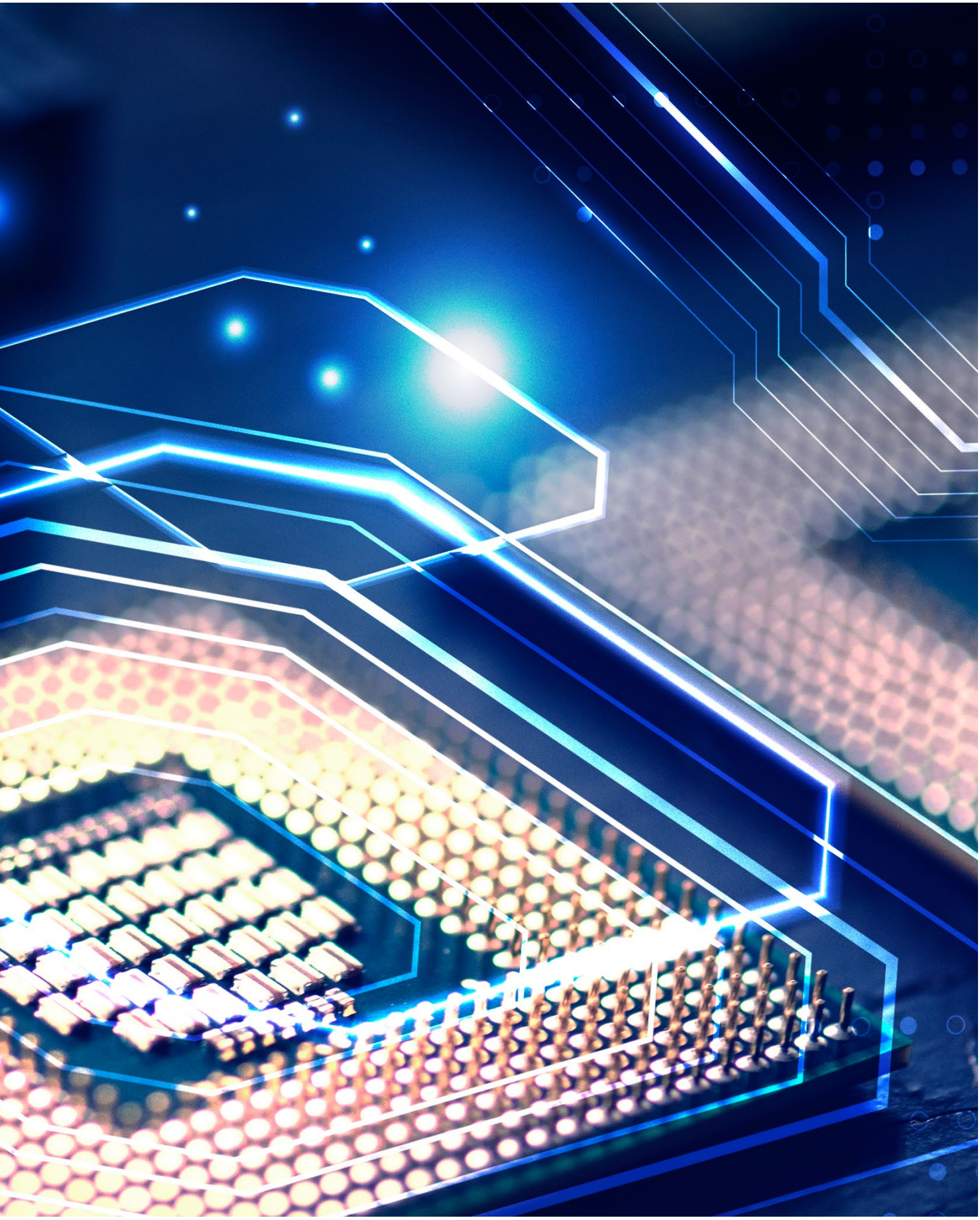
Figure 7 : E&E MSIC Codes

No.	Subsector's Categories	MSIC Code
1.	Diodes, transistors and similar semiconductor devices	26101
2.	Electronic integrated circuits micro assemblies	26102
3.	Electrical capacitors and resistors	26103
4.	Printed circuit boards	26104
5.	Display components	26105
6.	Other components for electronic applications	26109
7.	Computers	26201
8.	Peripheral equipment	26202
9.	Communication equipment	26300
10.	Consumer electronics	26400
11.	Measuring, testing, navigating and control equipment	26511
12.	Industrial process control equipment manufacturing	26512
13.	Watches and clocks and parts	26520
14.	Irradiation, electromedical and electrotherapeutic equipment	26600
15.	Optical instruments and equipment	26701
16.	Photographic equipment	26702
17.	Magnetic and optical recording media	26800
18.	Electric motors, generators and transformers	27101
19.	Electricity distribution and control apparatus	27102
20.	Batteries and accumulators	27200
21.	Fibre optic cables	27310
22.	Other electronic and electric wires and cables	27320
23.	Current-carrying and non-current carrying wiring devices for electrical circuits, regardless of material	27330
24.	Electric lighting equipment	27400
25.	Domestic appliances	27500
26.	Miscellaneous electrical equipment other than motors, generators and transformers, batteries and accumulators, wires and wiring devices, lighting equipment or domestic appliances	27900



PART II

CHALLENGES, INITIATIVES AND HIGHLIGHTS



CHALLENGES, INITIATIVES AND HIGHLIGHTS

CHALLENGES

For several decades, the manufacturing sector has been one of Malaysia's key economic drivers, contributing significantly to its GDP and job creation. However, the COVID-19 pandemic, which began in Malaysia with the detection of the first three cases on 25 January 2020, had a tremendous impact on the manufacturing sector and the socio-economic well-being of the nation. Since then, the country had been through waves of resurgence, and businesses, depending on location, had been subjected to waves of containment and restriction.

Malaysia's economy in 2020 was plagued with several challenges, namely:

1. A global pandemic that threatened the social and economic well-being of the nation;
2. Worldwide recession;
3. A looming international debt crisis;
4. A heightened risk of a resurgence in trade disputes;
5. The potential unravelling of global value chains; and
6. The impact of disruptive technologies that would change the nature of comparative advantage.

For several decades, the manufacturing sector has been one of Malaysia's key economic drivers, contributing significantly to its GDP and job creation.

These challenges continued into 2021, implying that more proactive measures were necessary to drive productivity growth and private sector innovation. The Government's priority is to reduce economic distortions, encourage innovation and digital adoption, strengthen market competition, improve the investment climate, and facilitate deeper regional integration. These, in turn, will unlock the pathways to generating jobs, increasing incomes and reducing poverty. The competitiveness of Malaysia's economy depends on its ability and agility to take on these processes.

The Malaysia Productivity Blueprint (MPB) identified some of the core challenges to productivity growth, which included, amongst others:

1. Limited levels of investment in technology and digitalisation by enterprises;
2. Insufficient commercial funding, especially for SMEs;
3. Low awareness, particularly among SMEs, of available options of new technology;
4. Lack of collaboration between academia and industry has led to a low research and development commercialisation rate;
5. Transfer of technology and knowledge by MNCs to local enterprises is also limited; and
6. The low quality and affordability of digital infrastructure.

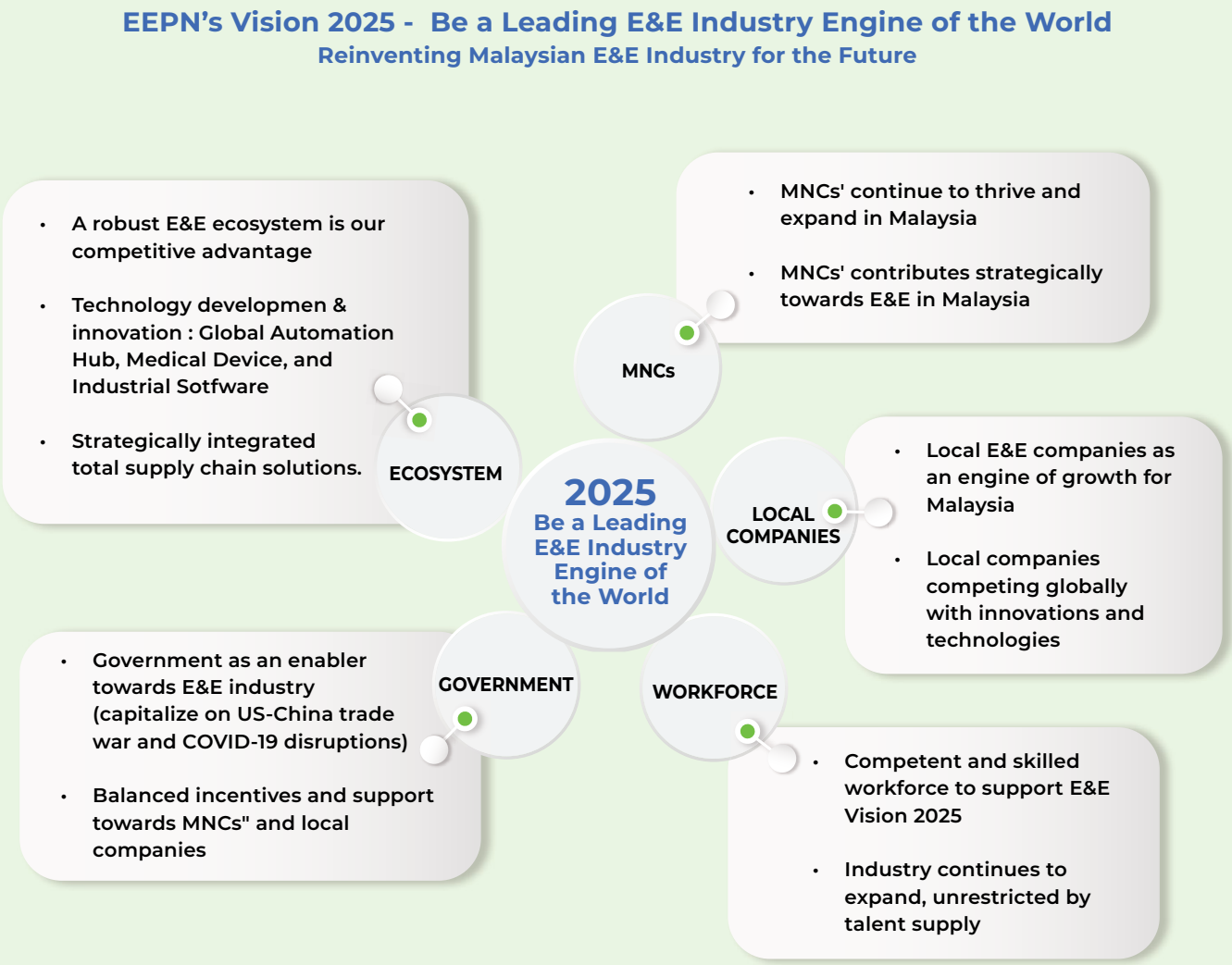
ELECTRICAL AND ELECTRONICS PRODUCTIVITY NEXUS (EEPN)

The Electrical and Electronics Productivity Nexus (EEPN) is one of the 11 Productivity Nexus set up to provide expertise and support to assist enterprises within the E&E subsector in understanding and tackling productivity challenges.

Over the 2018-2019 period, the EEPN undertook many dialogues with the public and private sectors, including multinational companies (MNCs), small and medium enterprises (SMEs), institutions of higher learning, training and technical bodies, industry associations, and government agencies and ministries. Surveys were also undertaken to confirm the actual state of Malaysia's E&E subsector.

Work was then done in 2020 to develop a vision for the E&E subsector, which is consistent with the National E&E Roadmap. The vision is to reinvent the E&E subsector so that Malaysia will be a leading E&E industry engine in the world, as shown below.

Figure 8 : EEPN's Vision for Malaysia's E&E Subsector



Source: EEPN (2021)

As seen below, a strategic plan was mooted towards realising this vision that encompasses five strategic thrusts.

EEPN's governance committee, championed by **YBhg. Dato' Seri Wong Siew Hai**, President of Malaysia Semiconductor Industry Association (MSIA), is structured according to the strategic initiatives (SI):-

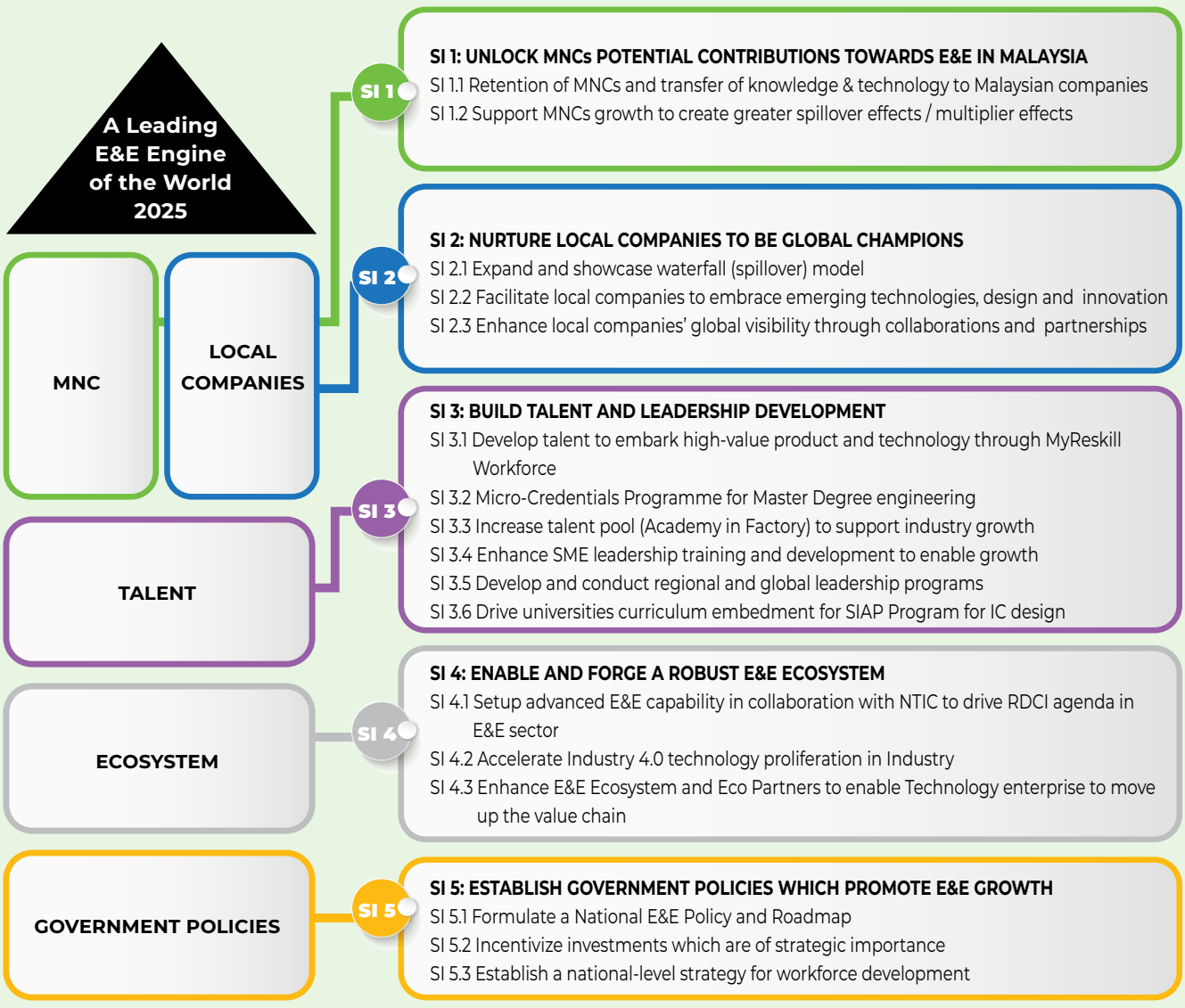
SI1: Unlock MNCs Contributions towards Malaysia, headed by **YBrs. Dr. Hari Narayanan,** President of Asia Pacific University of Technology and Innovation (APU).

SI2: Nurture Local Companies to be Global Champions, headed by **Mr. Lau Kean Cheong**, Group CEO of Inari Amertron Berhad.

SI3: Build Talent and Leadership Development, headed by **YBhg. Dato Seri Wong Siew Hai**, President of Malaysia Semiconductor Industry Association (MSIA).

SI4: Enable and Forge a Robust E&E Ecosystem, headed by **Mr. Shanmuganathan Palanisamy**, CEO of Kontron Asia Pacific Design Sdn Bhd.

Figure 9 : EEPN's Strategic Thrusts for Malaysia's E&E Subsector Towards 2025



Source: EEPN (2021)

EEPN'S PRODUCTIVITY IMPROVEMENT INITIATIVES 2017 - 2021

Consistent with the strategic framework, various initiatives were undertaken from 2017 to 2021. The key initiatives included:

Table 2 : EEPN Key Initiatives, 2017 - 2021

MPB Initiatives	Programmes	Outputs	Outcomes
Accelerate collaboration and strengthen knowledge sharing between industry players through the Centre of Excellence	EEPN supported the formation of an association to champion the interests of the semiconductor and related industries	176 members companies	Malaysia Semiconductor Industry Association (MSIA), officially registered on Jan 2021, is an industry association which covers individuals and companies incorporated in Malaysia who are involved directly or related to Semiconductor Industry (Electronics and Systems), Semiconductor Industry supply chain, institutions providing significant related services to semiconductor industry such as engineering, finance, legal and those societies, associations, chambers and government-linked agencies.
	Productivity Through Digitalisation: EEPN End-Users Plugfest Projects Compilation	1 Plugfest booklet has been published with 32 proofs-of-concept (POCs) projects	Showcasing 22 POCs on IoT and 10 POCs on AI machine vision
	Pilot workshop for MyReskill IoT	70 companies and 27 technology centres trained in IoT	• Reskilling of the workforce affected by the pandemic to stay relevant in the industry • Nationwide proliferation to all regions
	Three tracks of IR4.0 Regional Conference in East and West Malaysia	239 participants	• Discussion among academic and industrial communities on new trends and challenges, emerging technologies and topics relevant to today's fast-moving areas of IR4.0. • 66 papers presented in the area of AI and Computer Science, Engineering and Implementation, and Business/Management
	IR4.0 Hackathon events	• 3 hackathon events conducted nationwide • 32 teams with 106 students participated	Promoted AI-based Machine Vision system to universities students and encouraged them to develop affordable AI-based Machine Vision Proof of Concepts solutions for local companies
	6 series of Artificial Intelligence Webinars and 1 IR4.0 Week	1,500 participants attended	Promoted and increased the industry and public's understanding of the fundamentals of IR4.0 technologies

MPB Initiatives	Programmes	Outputs	Outcomes
	Artificial Intelligence for SMEs (AI4S) programme	93 companies trained (in 5 batches)	• Knowledge transfer of AI-based machine vision • On-site pilot implementation with 47 proof of concepts (POCs) completed • 31 POCs shortlisted to be showcased
	Annual National E&E Forum (2019-2021)	1,051 participants	• Sharing on The Future of the E&E subsector amidst the impact of the global supply chain • Role of technology centres in creating global companies: key learnings for Malaysia
	E&E Technology Adoption Mentoring programme	14 companies	• 14 IR4.0 Implementation Blueprint and Roadmap formulated • 2 companies achieved on embarking Readiness Assessment
Strengthening collaboration between industry, government and universities to ensure the supply of industry-ready engineers	Implementation of SIAP Programme for IC design curriculum embedment in participating universities	13 public universities & 14 private universities for Curriculum Embedment & Enhancement for IC design (SIAP) program	Sharing of 'Best Practices and implementation challenges for programme improvement in future roll-out to other universities.
	MyReskill Workforce - the industrial upskilling programme (trained and placed) for unemployed/ retrenched engineers, management and technicians	Completed 1 intake on embedded system & IoT for 28 pax	All candidates have been employed in collaboration with Malaysia Semiconductor Industry Association (MSIA)
	IR4.0 Graduate Upskilling training	50 pax fresh engineers trained	• All candidates have been employed • Receive certificate issued by Steerix GmbH, Germany
	SME Leadership Development	40 SME CEOs trained	Prepared SMEs for change and to embark on digital transformation

MPB Initiatives	Programmes	Outputs	Outcomes
Promote higher value-add activities, including Research, Development and Design and produce complex products	Established an industry-funded virtual marketplace portal called the Electrical & Electronics Malaysia Marketplace (EEMM)	67 companies	Assisted local companies in assessing global markets
	Digitised Design To Manufacturing (DDTM) MCAD project	21 SMEs trained in enhancing their design capability with the use of the Solidworks MCAD tool	These SMEs could conduct design activities in-house instead of doing design manually on sketch paper/ manual drawing or out-sourcing the design job.
	NCER Technology and Innovation Center (NTIC)	3 E&E pillars established · Advanced Technology Meister Program (ATMP) · Centre of Excellence (CoE) · Technology & Innovation (T&I)	Drove technology development & innovations EEPN was appointed as Project Manager
Enforce minimal guaranteed service levels for utilities and infrastructures in key industrial zones	Regulatory review on import-export matters relating to the E&E subsector	4 engagement sessions in North, Central and East Malaysia	Prepared a report on issues faced and recommendations to be escalated to relevant agencies
	Collaboration innovation on the Power Supply issue	2 benchmarking articles and one interview video published	A committee to address electrical power quality issues has formed together with TNB & ST to support Industry players to improve the robustness of the Equipment/ Supporting Equipment

Figure 10 : Key Accomplishments Until 2021

DRIVE I4.0	TALENT DEVELOPMENT	NURTURE LOCAL CHAMPIONS	HIGH VALUE ADD	ENHANCE E&E ECO SYSTEM	FIGHT COVID-19
1 Plugfest booklet published 32 POCs showcased	MyReskill Workforce	I4.0 business coaching to SMEs	Facilitated in the start-up of new IC design company – SkyeChip	Malaysia National E&E Industry Forum (2021)	MCO's economic impact
MyReskill IoT Trained 70 companies & Tech Centres engaged	DDTM 3D MCAD 21 SMEs trained	Preparing SMEs towards public listing exercise 14 private universities	Design & development	RMK-12 EPU Webinar	Assist companies to get approval on PIKAS on-site PPV
6 AI Webinars & 1 Industry 4.0 Technology Week	SME leadership programs	Buy local (Inari's Waterfall effect)	NCER's Technology & Innovation Center (NTIC)	Virtual Market Place Portal (E&E Marketplace Malaysia)	New Way of Working (WOW) Webinar
93 SMEs trained in AI4S (5 batches training)	I4.0 Training : On-site & Webinars			Committee to address electrical power quality issues	Exhibition of 100 days AKM
	Post School Finishing (PSF) - Utilization of EDA tools for IC Design			Best Practices from frontier companies	
	Curriculum Embedment & Enhancement for IC design (SIAP) 13 public universities, 14 private universities			LMW business roundtable discussions	

Source: EEPN (2021)

SPECIFIC HIGHLIGHTS

Creating Value Towards IR4.0 Ecosystem - The Plugfest Workshop Series

Realising that IR4.0 adoption is crucial for business survival and further growth in innovation-led value creation, EEPN has been spearheading its adoption among Malaysian companies and SMEs. One of their initiatives is the Plugfest workshops on Industrial Internet-of-Things (IIoT), and Artificial Intelligence based Machine Vision system (AIoT).

Participants of the workshop organised in 2020 were required to select cases and problems in their work environment to be solved. They matched and tested solutions provided by designated partners in the industry. Upon completion of Plugfest 1.0 and Plugfest 2.0 trainings, participants completed Proof-of-Concept (POC) projects at their workplaces. This enabled end-users to identify game-changers and develop solutions that would transform their organisations through smart manufacturing.

The Plugfest workshops series is one of EEPN's winning formulas in creating value for the IR4.0 ecosystem for local companies, especially SMEs. It provides experiential developmental learning. It also gives confidence to SMEs that the adoption of IR4.0 is not confined to larger companies. Undoubtedly, the adoption of IR4.0 can be wide-ranging, encompassing not only the E&E subsector but also other subsectors, including the machinery and equipment (M&E) subsector, automotive, plastics, food and beverages.

The impact of the COVID-19 pandemic led to disruption and distortions in the business ecosystem in Malaysia. It affected supply and demand and the way of doing business globally. Many business owners are relooking at their business models and planning the acceleration of their business recovery towards digital transformation while strategising factory operations to increase productivity and efficiency.

IR4.0 implementation can improve and sustain the competitive advantage of manufacturing companies. The six immediate priorities to introduce game-changers and significantly improve productivity are:

1) Restructure and improve the management of foreign workers

- Formulate and implement a comprehensive foreign workers policy;
- Use a sector-specific, structured, phased-out plan complemented by the availability of local workers and automation;
- Apply market mechanism based on levies;
- Ensure robust engagement and communication; and
- Streamline management of foreign workers through a single point of authority.

2) Encourage the adoption of IR4.0 technologies by companies across main economic sectors

- Develop human capital;
- Create a dedicated pool of investment funds or align existing funds to drive the IR4.0 agenda nationally;
- Set up IR4.0 Centre of Excellence to support industry adoption; and
- Ensure quality and coverage of digital infrastructure, especially broadband, to support IR4.0.

3) Strengthen digitalisation among SMEs through e-commerce and adoption of innovative technology

- Ensure seamless movement of SMEs through the entire innovation process under a single platform by providing access to technical assistance, market information, and incubation and testing facilities;
- Increase promotion and marketing of e-commerce to SMEs in collaboration with various platform providers;
- Streamline incentives towards ICT-based business solutions for productivity gains;
- Expedite the establishment of a single window for both business registration and licensing to reduce regulatory burden and facilitate targetted intervention; and
- Intensify the internationalisation of SMEs through the e-TRADE platform and strategic market alliances.

4) Embed productivity targets for enterprises into disbursement processes of new grants, incentives and soft loans

- Establish clear guidelines on approval processes for funds;
- Align disbursement of incentives to productivity milestones; and
- Embed self-tracking culture across enterprises by enforcing continuous monitoring of productivity improvements by fund recipients.

5) Remove non-tariff measures that impede business growth and improve the efficiency of the logistics sector

- Accelerate implementation of uCustoms;
- Introduce guillotine approach to reduce regulatory burden;
- Establish and institutionalise an innovative policy development engagement mechanism to embrace disruptive technology; and
- Accelerate implementation of the Logistics Masterplan.

6) Evolve governance model to drive game-changing implementation of Malaysia Productivity Blueprint

- Undertake four key roles - strategic oversight, advisory, coordination and monitoring, and implementation.

“EEPN has also organised an IR4.0 regional conference and also IR4.0-themed hackathons in both East and West Malaysia.

So far, we have eight technology centres including one in Sarawak, and we hope to open more for companies to get IR4.0-related training or advice.

Training classes for SME employees have been established in collaboration with Universiti Malaya and RWTH Aachen University of Germany to provide advanced hands-on training on programming and on solving industrial problems. Students will also be exposed to IR4.0 and hopefully when they finish their university degree, they will join the workforce with a better appreciation of IR4.0.

In addition, there will be an SME leadership programme for companies that earn RM3mil to RM10 million in revenue to help them move their companies forward.

This will encourage MNCs to support local companies by choosing locally made automation over foreign ones.

YBhg. Dato’ Seri Wong Siew Hai
EEPN Champion & President of MSIA

As we prepare them to grow and go for listing, key topics will be introduced to them such as in business strategy, human resource development, and digitalisation.

So far, SMEs have provided positive feedback as these programmes have helped them prepare and steer their companies in the right direction.”

Figure 11 : Plugfest 2.0

Plugfest 2.0 (AIOT)

- Plugfest 2.0 features an Artificial Intelligence (AI) based machine vision system.
- This workshop aims to educate and empower the participants to adopt machine vision system in their work environment.
- Participants will be taught photo capturing techniques, images labeling systems, machine training algorithms, and finally machine learning and inferencing.
- A total of 45 participants from 25 companies participated.
- Delivery partner was Penang Skills Development Centre (PSDC) Penang.
- Supported by Intel Malaysia and Axiomtek Taiwan.

Example of Proof of Concept (POC)s from Plugfest 2.0

STRATUS Automation

Pain Point:

- Mix Part: Different Bearing Enclosure Casing found during assembly at Conveyor Assembly.

- Inspection: IQC Operator perform screening by counting groove holes (11 or 9) manually with naked eyes and separate accordingly into bins.

Result And Impact of The Project

- Inspection speed increase by 64%
- Output increase by 64%
- Cost Saving ~RM3.5k

AI Based Machine Vision System

Before implementation

- Operator using ruler or pointy object to count the groove on each bearing manually.
- Bearing split into 2 category from same supplier:
  - 9 groove holes - 11 groove holes
- Once identify the groove count, operator will segregate bearings into separate container or bins.
- However, operator may carelessly misplace the Bearing into wrong bin or miscount.

After implementation

- Prepare 2 bin and place in-between the camera.
- Each bearing place under the camera for sorting (9 or 11 groove holes) from supplier packaging.
- Software written to recognize and count the bearing groove holes automatically.
- Arrow (Left/Right) shown on the monitor to let operator identify which bin direction shall the bearing be located after sorting.

Figure 12 : EEPN Hackaton 2020

Hackathons West & East Malaysia

- Featuring an Artificial intelligence (AI) based machine vision system, based on Intel OpenVINO™ toolkit
- Delivery Partners
  - West Malaysia:
  - Iskandar Regional Development Authority (IRDA) and UTM
  - East Malaysia: MPC Sarawak, Curtin University, MCMC, MISI4.0, and Serba Dinamik

Two virtual hackathons were organized

West Malaysia	East Malaysia
10th Oct 2020	18th Oct 2020

West Malaysia (10th Oct 2020)

Background

- Conducted via online
- Delivery partner – IRDA and UTM
- Opening Speech by CEO IRDA, Dato Ismail Ibrahim
- Closing remarks by Dato Seri Wong Siew Hai, EEPN Champion
- 32 teams registered, 12 teams make it to Live Pitching session

	Team	Universities
Champion	Deep Port Vision	Universiti Teknologi Malaysia
1st Runner up	Infinitea	Universiti Teknologi Malaysia
2nd runner up	AI Dream Teams	Universiti Teknologi Malaysia
Consolation	Nox	Unversity of Nottingham
Consolation	Anomally	Universiti Teknologi Malaysia
Consolation	Far Ahead	Universiti Teknologi Malaysia
Consolation	Eagle Eye	Universiti Sains Malaysia
Consolation	4.0 The Future	University of Nottingham

East Malaysia (18th Oct 2020)

Background

- Conducted via online platform and live at Serba Dinamik, Virtual Park, Sarawak
- Delivery partner – MPC Sarawak, MCMC, Curtin Uni, Misi4.0
- Opening Speech by Dato Abdul Latif bin Haji Abu Seman, Director General of MPC
- Closing remarks by Yang Berhormat Datuk Snowdan Anak Donald Lawan, Assistant Minister For Youth And Sports In The Cabinet Of Sarawak
- 13 teams make it to Live Pitching session

	Team	Universities
Champion	Happy Go Lucky	Universiti Malaysia Sabah
1st Runner up	Hozatech	University College of Technology Sarawak
2nd runner up	Will	University College of Technology Sarawak
Consolation	Centexs	Universiti Malaysia Sarawak
Consolation	DOT	University College of Technology Sarawak
Consolation	Fantastic Five	Curtin University
Consolation	Geekology	Curtin University
Consolation	Prometheus	Unimas

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EEPN press coverage in 2020
http://bit.ly/EEPNPress2020

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@mpc_hq malaysia productivity corporation

Driving Productivity of the Nation

The pillars of IR4.0 are the leading edge of the competitive smart manufacturing of the future. Concerted efforts must be made to facilitate more Malaysian companies to embrace IR4.0 to develop the critical mass of technologically competent companies. It is vital that Malaysian E&E and M&E companies adopt a willing attitude towards enhancing their IR4.0 capabilities and be ready to provide customised solutions and products and compete for jobs internationally. It will become one of the core technologies to accelerate the development of the ecosystem. Owing to linkages within and among industries, businesses of all sizes will benefit from this. Further, the supply chain within the country will be improved as more and more local companies can supply products and services needed by MNCs.

Malaysian Contract Manufacturers (MCMs) can play an important role within the E&E value chains. By teaming up with MCMs, MNCs can determine what is needed locally and actively work together. Such partnerships can shorten lead times, reduce production costs, and support troubleshooting and maintenance. In addition, MCMs are capable of providing design, software programming, vision inspection technology, and automation solutions with international quality standards.

It was estimated that the value of contract manufacturing within the E&E subsector alone would exceed US$554 billion in 2026. Thus, Malaysian companies in this industry should avail themselves of opportunities to enhance their skills and knowledge in IR4.0 to avoid losing out on future opportunities.

The digitalization of many conventional businesses and adoption of I4.0 in manufacturing industries was accelerated by the recent pandemic and supply chain disruption. As Malaysia and the world moves towards endemic and consumer markets open up, the surge in demand will continue to adversely affect the current supply chain crisis.

With close to RM 50 billion recent FDIs from companies such as Intel, AT&S and Infineon Technologies coming into Malaysia, and the rapid expansion of the MNCs, tremendous opportunities lie ahead for the Malaysian LLCs and SMEs. Industry 4.0 is essential in Malaysia manufacturing industry, especially the SMEs to stay competitive in the global market, reduce cost and to ensure long-term sustainability. The growth of SMEs will eventually contribute back to Malaysia's economy.

Whilst Industry 4.0 adoption is deemed crucial for business survival and further growth in innovation led value creation, we still do not see an easy path for SMEs to step up to embrace the opportunity, either as the adopter of the trend or a creator of the value.

Success stories

The guiding principle that has been at the forefront of companies such as **NationGate Solution (M) Sdn Bhd.** is that technology brings change and the answer to higher efficiency. Moving with the change vis-à-vis through technology provides better services to clients. Companies need the flexibility to overcome challenges. Thus, NationGate, which offers services, among others, in high-speed Surface Mount Technology (SMT), Chip on Flex/ Board (COB), Final Assembly (Box Build) and precision Plastic Moulding and Final Testing, leverages IR4.0 technology to provide better flexibility for smart production processes. The adoption of IR4.0 technologies has led to a 30 per cent increase in the company's efficiency.

Industry 4.0 is essential in Malaysia manufacturing industry, especially the SMEs to stay competitive in the global market, reduce cost and to ensure long-term sustainability.

Box Item 1 : NationGate's IR4.0 Technologies

Mr. David KB Lim, the Resource Planning Director of NationGate, commented that all industry players could implement IR4.0 technologies into their operations. Companies, especially SMEs, should not be afraid of the high costs and complex operations. The costs and complexity depend on which pillars of IR4.0 they want to prioritise and address first. The companies themselves chart the direction and pace of change.

Mr. Lim advocated that it was alright for beginners not to know what to do and how to start at the onset. Having the passionate desire to adopt IR4.0 in work processes, the strong commitment of the top management and good employee engagement is the driving force. Seeking knowledge from others and self-experimentation can facilitate progress. Good software partners and appropriate hardware can help with data collection and analytics, and process integration.

Box Item 2 : Vitrox's V-One Platform Success

There are also some good local vendors like Vitrox Technologies Sdn. Bhd that companies can work with to achieve their goals. Vitrox is a factory equipment supplier in Penang which has collaborated with many local companies, both MNCs and SMEs, in their journey towards adopting IR4.0. Using the V-One platform, they have provided cost-effective solutions for IR4.0 proponents. Being a locally developed platform drastically reduces the financial burden for the adoption and transition to IR4.0 processes. Vitrox has not only been working with E&E companies. They have also worked with non-E&E players in industries such as metal fabrication. The application is extensive and beneficial to many.

Box Item 3 : SME Development – Swift Bridge Technologies

A success story of how an SME leveraged the assistance of government agencies such as MPC, MIDA and MATRADE is Swift Bridge Technologies from George Town, Penang. This company specialises in developing high performance, custom cable solutions for the test and measurement market. More than 70 per cent of its products are exported. Primary markets include the United States, Europe and parts of Asia.

Since its inception in 2012, quality has been the foundation upon which Swift Bridge Technologies has built its lasting customer relationships. Pride in providing high-quality products and excellent services is reflected in its Quality Management System and the continuous improvement cycle for both products and processes. Compliance with strict international manufacturing, safety and product performance standards provide the marketplace with a confident assurance of value.

"Adoption of higher technology elevated our revenue in 2019 by 83 per cent. However, the 2020 pandemic had a devastative impact which disrupted our business and reduced our revenue streams. Nonetheless, our entrepreneurial spirit was buoyed by the support of Government agencies like MPC (EEPN included), MATRADE and MIDA through webinars, IR4.0 workshops, virtual trade fairs, and advisory sessions gave us insights on our journey. We just continued to tunnel through and managed to sustain. We expect a better performance in 2021," said **Mr S.K. Chong, Managing Director of Swift Bridge Technologies**.

"I was inspired by what I learnt from the SME Leadership Course organised by MPC and EEPN in 2018. It covered a vast area of management and leadership, including financials, change management and product development. I realised that hard work and commitment alone do not help you through a crisis or grow a company. You need to innovate and develop new products to make better margins while keeping costs down. Currently, amid its IR4.0 journey, the management and staff are undertaking changes, modifications and acquisitions on a stage-by-stage basis to improve production levels and efficiency. We may be a small company, but our integrity and reliability have won us many contracts. We believe that by 2024, our revenue would have more than doubled.", he continued.

Strengthening and supporting the Malaysian E&E Subsector – The Structural Industry Apprentice Programme (SIAP) for IC Design.

The idea to focus on IC design took fruition after almost two years of discussion that EEPN facilitated. A national survey on the needs of IC design talents initiated by MIDA revealed that more than 5,000 IC design talents would be needed over the next five to seven years to bring the E&E subsector to the next level.

As a result, the Structural Industry Apprentice Programme or SIAP, a university enhancement and embedment programme for IC design, was developed. It has six modules, and these have been developed via a series of intense sessions with more than ten committed companies facilitated by subject matter experts from MIMOS and CREST. The use of state-of-the-art design tools aids the application-centric modules.

This industry-initiated curriculum is well supported by both the private and public sectors, including the Ministry of International Trade (MITI), Malaysian Investment Development Authority (MIDA), the Collaborative Research in Engineering, Science and Technology Centre (CREST), MIMOS, Ministry of Higher Education (MoHE) and Malaysia Productivity Corporation (MPC).

Work is underway with MoHE to identify public and private universities with the base capabilities in IC technology to participate in the project.

Presently, seven public universities participate in the pilot project, namely Universiti Sains Malaysia, Universiti Malaysia Perlis, Universiti Malaya, Universiti Teknologi Malaysia, Universiti Teknologi Mara, and Universiti Putra Malaysia and Universiti Tun Hussein Onn Malaysia.

The pace of implementation of SIAP has slowed down due to the pandemic. Notwithstanding this, efforts are still ongoing with the MoHE to make this programme a success.

“SIAP is not just about training the students, but also enhancing the knowledge and competencies of the lecturers in the universities. As we rolled out SIAP as a pilot project to the seven universities, we will also train over 100 lecturers from various universities (public and private). Once the pilot is completed, we plan to roll out the SIAP curriculum for IC design to other universities with the support of MoHE”

Dr. Hari Narayanan
President
Asia Pacific University of Technology and Innovation (APU)

According to **Associate Professor Dr. Wan Zuhainis Saad, the Director at the Ministry of Higher Education's (MoHE) Academic Excellence Division**, ***"It is under the Malaysian education blueprint to produce graduates who are holistic entrepreneurial and balanced. We ensure that all university programmes are relevant and reduce the gap between supply and demand. We monitor programmes, facilitate the universities, and engage the industry to identify gaps. We need to work together and collaborate, not only with the industry but also with other agencies and ministries, to produce the future workforce."***

She added, ***"I believe that SIAP is an excellent effort by EEPN to allow students to experience industry relevant application centric learning. This is primarily to provide an industry-immersive experience at the end of semesters and at the beginning. We need the industry's buy-in to accept our students for internships and co-develop the programme and customise graduates for the industry. We hope the industries and universities can co-own the programme and take responsibilities-SIAP as an excellent example.",*** she concluded.

Enhancing Symbiosis Within the Subsector

Over the past decades, the Malaysian E&E subsector has grown significantly. What has once deemed an industry dominated by foreigners is today a strong pillar of the Malaysian economy, with many MNCs and SMEs led by local and foreign players. MNCs generally are the major investors, injecting much-needed funds, technology and knowledge. Nonetheless, SMEs have formed a vital support base for the industry. This symbiotic relationship has contributed significantly to the development of the industry. Supply-chain disruptions and other challenges encountered during the COVID-19 pandemic made this relationship even more apparent.

The idea of strengthening co-dependency has emerged in discussions among EEPN members. MNCs such as Greatech Integration (M) Sdn Bhd has advocated that MNCs can play a significant role in helping local companies develop into stronger partners for the overall good of the nation.

YBhg. Dato' Tan Eng Kee, CEO of Greatech, opined that a form of a partnership programme between an MNC and a local company should be developed to establish synergy between the two. This partnership requires a commitment between parties.

Local companies mostly face problems in research and development, funding, and marketing. He suggested that the Malaysian Investment Development Authority (MIDA) could introduce some guidelines that can help local companies develop through the help of MNCs if they wish to invest here in Malaysia. For example, MNCs can facilitate SMEs to expand and grow their businesses internationally.

“I am of the opinion that MNCs should play a larger role in developing local companies. For local companies, marketing is very important as MNCs have the advantage of owning sales offices worldwide to market their products and get cheaper local resources. That’s why we need to learn how to position ourselves in terms of marketing, and in terms of strategy. And if all of these are fulfilled, we can become international players as well.

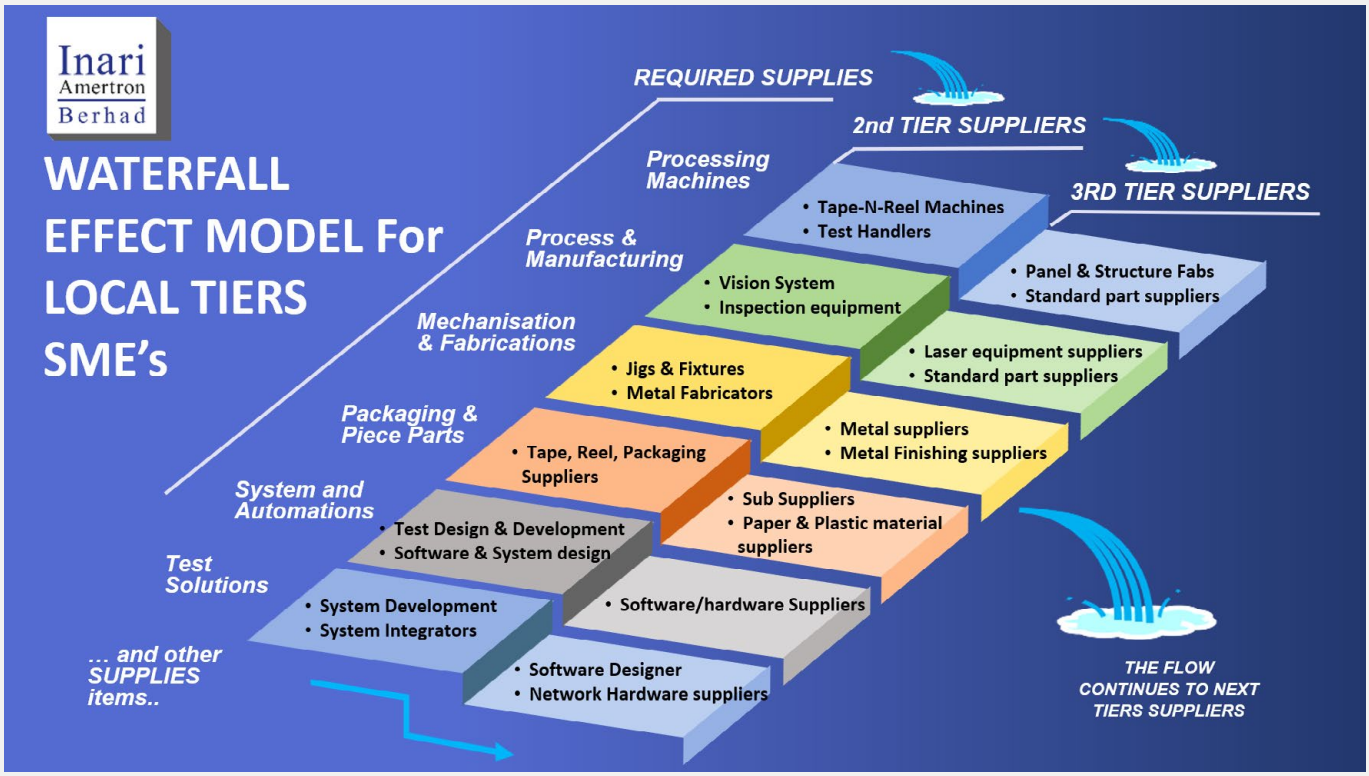
Gaining a foothold overseas allows more opportunities. Unfortunately, with the current restriction in travelling, many SMEs are constrained from not only furthering their international reach, they are also confined within their state, which makes matters worse.

Before long, the situation becomes unsustainable and by the time the pandemic ends, many local companies could end up as casualties in the war against the infection.

It doesn’t matter where you are in Malaysia, the competition is not only with local companies; thanks to globalisation, it is now worldwide”

YBhg. Dato’ Tan Eng Kee
CEO of Greatech Integration (M) Sdn Bhd

Box Item 4 : Inari's Waterfall Effect Model



SMEs are vital lifeline in a country, as they represent the grassroots that keep the local economy going by encouraging growth, employment and income. Multinational corporations (MNCs), however, also form another crucial layer, by accentuating and propelling growth in the nation by injecting much needed funds, technology and knowledge into the economy.

In fact, MNCs and SMEs hold a symbiotic relationship that will benefit one another.

In strengthening the domestic ecosystem, Inari Amertron Bhd as one of the electronics manufacturer can be used as a model. The company has spent millions of ringgits buying equipment from local companies.

"We need to create global champions the way Korea and Taiwan did and we need to allocate a lot more efforts and resources in supporting local companies. With timely and adequate intervention and development programmes by various government agencies, far more can be accomplished on a global scale. There are several programmes and projects have been initiated by the government; we need to follow through and ensure these are going through successfully."

Mr. Lau Kean Cheong
Group Chief Executive Officer & Executive Director
Inari Amertron Berhad

Addressing Concerns of the E&E Subsector Through the E&E Forum

SMEs must embrace the advent of technology and enlarge their networks to grow their businesses. However, this is not an easy task. To address their concerns and inspire them, EEPN has organised a series of annual E&E Forums since 2019. Many renowned speakers from international bodies shared their views, including panellists from Semiconductor Industry Association (SIA), USA; Industrial Technology Research Institute (ITRI), Taiwan; IEI Integration Corp., Taiwan; SEMI Taiwan; and the World Bank.

Figure 13 : Malaysia National E&E Forum 2020 and 2021

The forum was opened to governmental agencies, especially policymakers, members of the E&E subsector, SMEs and MNCs. Three main areas covered were:

1. the future of the E&E subsector amid supply chain disruption encountered due to the COVID-19 pandemic;
2. ways of growing system design and development capabilities within Malaysia to enable it to rise as a recognised regional and global force; and
3. the challenges that local players are facing to ascend the value chain.

Recommendations and findings from the National E&E Forums are:

1. Tech centres, collaboration and an R&D-focused ecosystem are vital in creating global champions;
2. The government is the most crucial stakeholder in figuring out key strategies;
3. Taiwan's ITRI is a strong example of how tech centres can bridge academia and industries;
4. Partnering with industry giants has transformed Taiwan's E&E capability, from manufacturing basic semiconductor boards to designing cutting-edge turnkey solutions;

5. The role of the state is to provide the ecosystem to enable firms to adopt technology, undertake R&D, as well as create an atmosphere that continuously reskills and upskills their workers;

6. The way forward is to ensure an ecosystem that is not only conducive but allows feedback to policymakers, who will provide speedy responses;

7. Companies must be mindful of the need to find ways to design better to attain better marketing opportunities that will lead to competitive pricing in the worldwide market;

8. Developing new products is the key to growing the motivation or momentum continuously in the company;

9. There is a need to build a whole culture for Malaysian companies to move forward and to cultivate an environment for R&D, engagement with local SMEs;

10. Collaboration with MNCs is beneficial. MNCs can bring in their resources, propose more up-to-date and forward-thinking technologies, and drive and aggregate demand to achieve economies of scale, thereby reducing costs; and

11. MNCs can assume a role in developing talent, not just in R&D but also in the surrounding ecosystem.

Facilitating E&E companies on the road to recovery

Financial problems and liquidity constraints, falling productivity, loss of customers, difficulty to save jobs, inability to meet contracts and reinventing business were some of the challenges that were faced by companies impacted by the pandemic. It has been estimated that the industry has suffered large losses during the four phases of MCOs in 2020 and 2021.

EEPN, in collaboration with other government agencies, embarked on various initiatives to facilitate and accelerate the recovery of E&E companies. The first was through webinars, followed by Virtual Advisory Clinics, Business Coaching, and trade clinics on how to gain market access and a Virtual Marketplace to promote Malaysian E&E companies to the world.

Figure 14 : Business Recovery Advisory Model

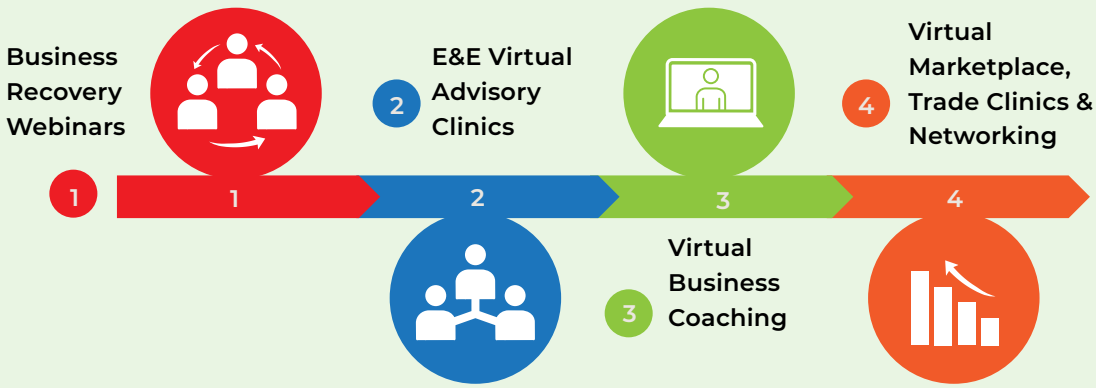


Table 3 : Business Recovery Webinars

Initiative	Programmes	Outputs	Outcomes
Facilitating E&E companies on their road to recovery	Three webinars as learning platforms a) Rethink, Reinvent, Revitalise In The New Normal (13 May 2020) b) Making The Climb Towards Recovery (18 May 2020) c) Growing Business Against The Tides of Disruption (28 May 2020)	Registrants : 653 Participants : 465 Countries : 16 % MNC : 14% % SME : 86% Registrants : 324 Participants : 226 Countries : 4 % MNC : 13% % SME : 87% Registrants : 576 Participants : 418 Countries : 7 % MNC : 8% % SME : 92%	Facilitated the development of Recovery Action Plans by Government and the private sector. Facilitated sharing of experience and consultative sessions among industry associations, business communities and government agencies. Identified and shared best practices that can be adopted to overcome challenges brought about by the pandemic. Reached out to companies who needed help so that relevant advisory sessions and assistance could be given.

The business recovery webinars were organised as learning and discovery platforms, with participation by more than 1,000 participants. The first was entitled **"Rethink, Reinvent and Revitalise in the New Normal",** and the objective was to identify challenges faced by companies affected by COVID-19 and strategies to overcome them. The second was **"Making the Climb towards Recovery"**, which aimed at helping SMEs to understand how to develop recovery plans for their businesses. The third webinar, **"Growing Business Against the Tides of Disruption"**, assisted SMEs in seizing opportunities in markets. The Business Recovery Webinars were attended by companies in E&E and related sectors. Out of the 1,129 attendees, 10 per cent were from mid to large companies, while the remainder were SMEs. Feedback obtained was relayed by EEPN to the Government.

In addition, EEPN, in collaboration with Digital Productivity Nexus, organised a webinar on Digital Transformation. The IR4.0 webinar in partnership with Elliance touched on the **"why, what and how of IR4.0"**, while Aachen University, Germany, covered the technical aspects of IR4.0. In the new normal, companies are greatly encouraged to go digital with more minor touches and implement IR4.0 programmes to improve productivity and effectiveness to serve their customers better.

The EEPN Virtual Advisory Clinics connected companies to advisors one-on-one and helped companies undertake analytics and diagnostics on their respective companies for appropriate remedial action.

To assist local companies in accessing more opportunities in the international marketplace, an industry-funded virtual marketplace portal called the Electrical and Electronics Malaysia Marketplace (EEMM) was established. 50 companies participated in the launch of EEMM, and many more are planning to come on board. EEPN intends to collaborate with local and foreign bodies to create more marketing opportunities for Malaysian companies.

Figure 15 : Electrical & Electronics Marketplace Malaysia (EEMM) Portal

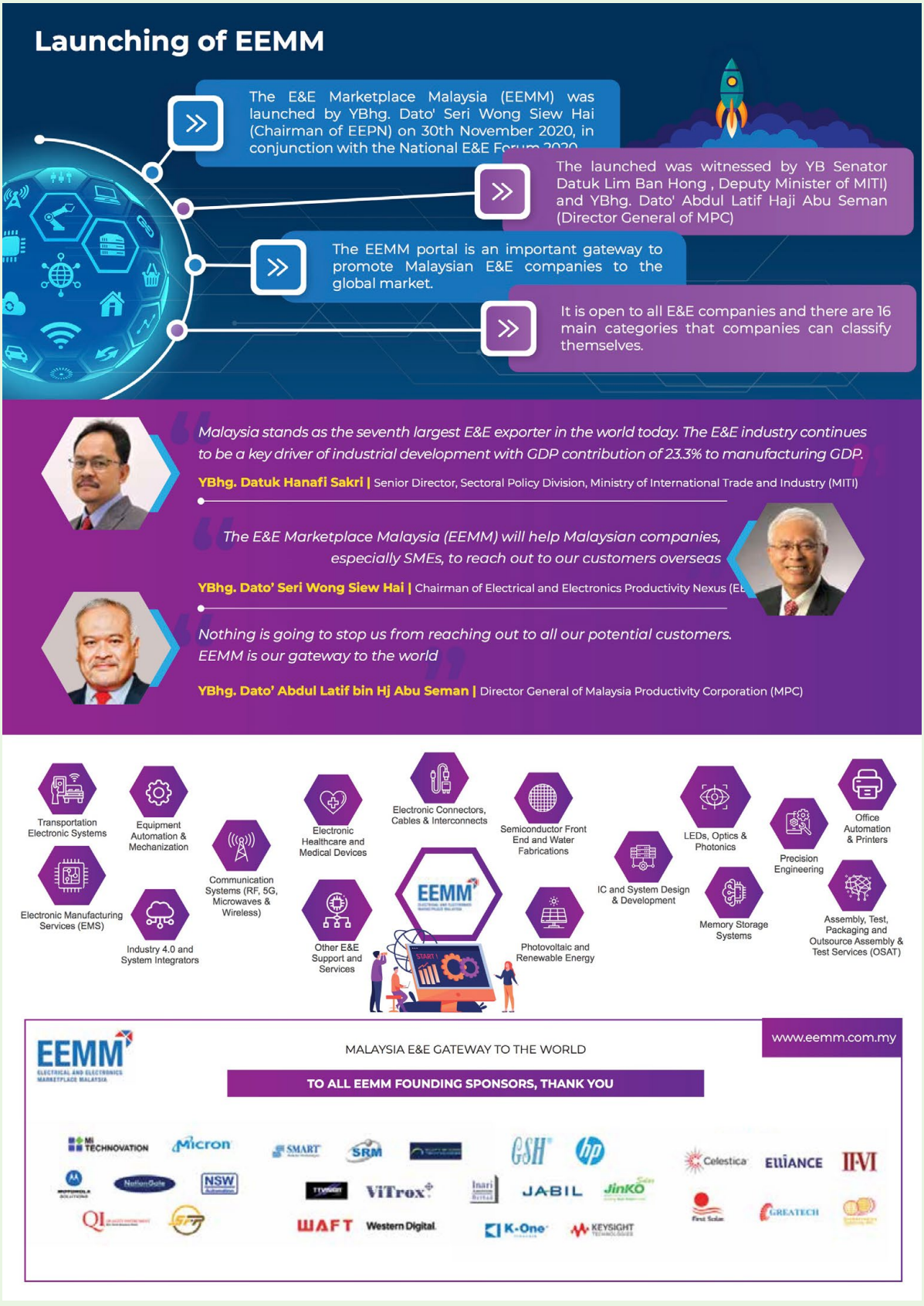
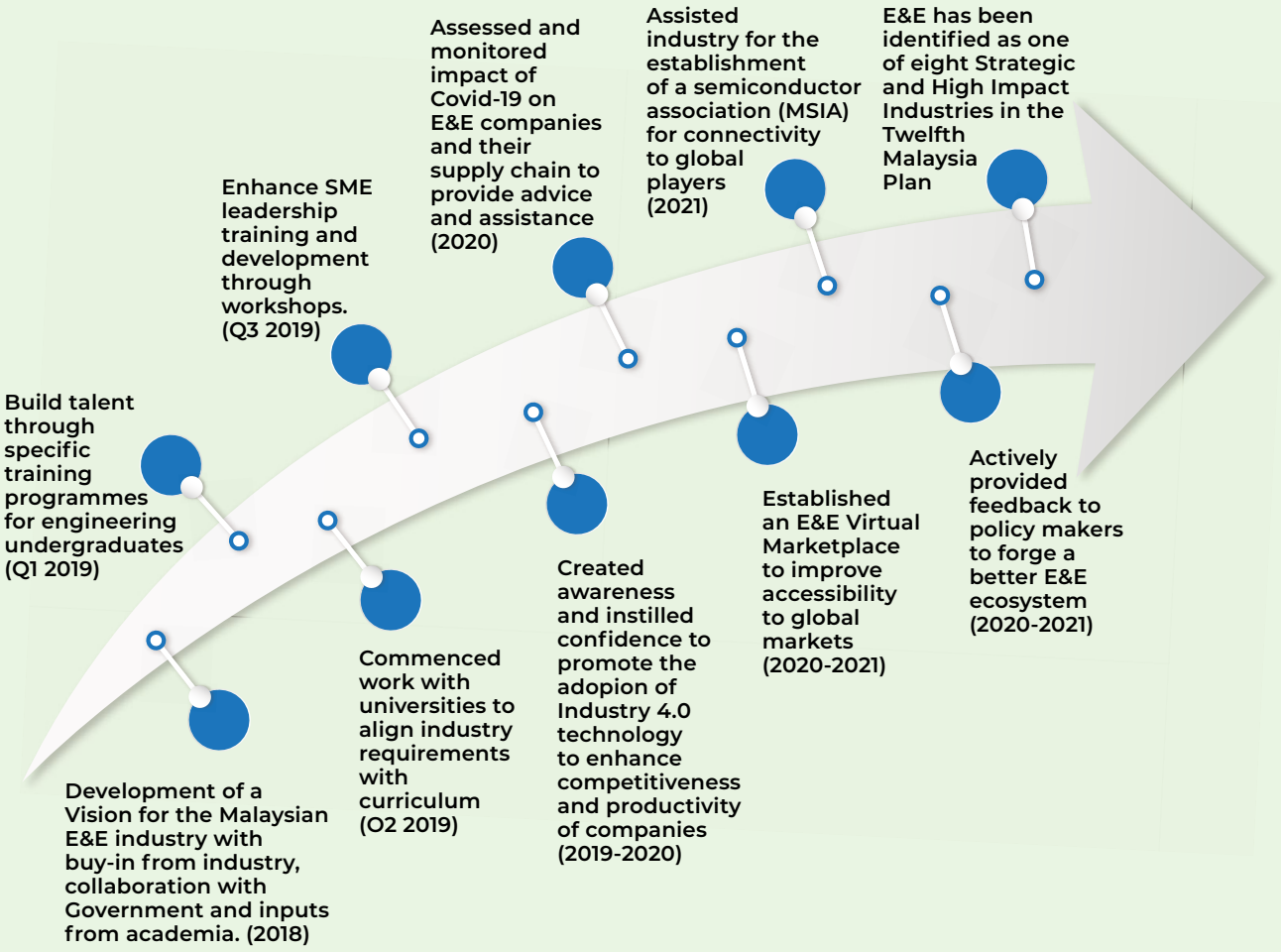


Figure 16 : Summary of Milestone Achievements up to 2021



Source: EEPN (2021)

EEPN 2022 AND BEYOND

The initiatives in 2022 aim to impact the industry workforce, nurture the talent pool, enhance higher value-added activities, and create value for the IR4.0 ecosystem. The push is to foster a productive culture through innovation and improve competitive advantage vis-a-vis skills development, especially for SMEs. Efforts by the government and the industry to scale up technology transformation must be further enhanced.

The way forward is to enhance the momentum of game-changing activities. For Malaysian companies, especially SMEs, the Government must provide assistance packages and programmes that will directly help them or train them to become more agile and better adapt to change. Since the E&E subsector is a major contributor to the economy, the viability and sustainability of its players are important.

Small and medium-sized companies must be encouraged and facilitated by the government and industry association to avail themselves of the Industry4WRD Intervention Fund by MIDA, which provides financial assistance for their IR4.0 manufacturing and related services initiatives. Many SMEs still do not know what to do and how to access the fund. To some, the process for consideration and approval was frustratingly long.

By focusing on SMEs' adoption of selected emerging technologies, the companies will develop core competencies that will improve the future advancement of the E&E subsector. More tech centres can be established to populate the numbers until a critical mass.

The Government must steer the E&E subsector away from stagnation in labour-intensive, low tech state and facilitate its journey up the value chain with holistic manpower planning for the industry. The government could initiate more targeted scholarship programmes to grow talent with new skill sets for the industry. Industry-ready talent will attract more high-tech investors in the future. Hiring foreign talents from local public and private universities should be allowed as a short-term measure. At the same time, the current visa approval process for hiring targeted talents from other countries should also be improved.

To strengthen collaboration between industry, government and universities, there is a need for more focused industry advisory panels for selected areas by the universities so that industry subject matter experts can provide the academia with the latest technology and application trends in the industry. Academic staff should also undertake sabbatical in local E&E companies, as there are numerous opportunities to work and gain experience in these companies' state-of-the-art and new technologies.

There is a need to balance between 'increasing more content into the universities' curriculum with specific competencies' versus 'teaching under-graduates on science, technology and engineering fundamentals. It is also important to develop soft skills among graduates to better fit into the international work environment.

Companies can be incentivised to start nurturing talents right at an early stage. Suitable candidates can be adsorbed at the end of the training or internship. This improves the matching of candidates to jobs available for companies. It also enhances the development and flow of talent. Audits have to be carried out by employers to see if their investment in skills development is adequate to retain their high performing talent.

The Twelfth Malaysia Plan (2021-2025) has included tax incentives for industries to train students, and academics, facilitating the transformation from a labour-intensive to a knowledge-based economy. Greater collaboration between government, employers, and unions is vital to provide a sustainable funding mechanism supporting continuous upskilling and reskilling of local talents and local technology start-ups. Young talents are needed to propel the E&E subsector to new heights and for Malaysia to be recognised as a leading E&E hub globally.

According to SEMI, a global industry association representing the electronics manufacturing and design supply chain, Malaysia contributes about 13 per cent to the global back-end semiconductor output. Penang has been lauded as one of the most significant microelectronics assembly, packaging, and testing hubs globally. This has successfully positioned Malaysia in the global supply chain of electronic manufacturing services, outsourced semiconductor assembly and testing (OSAT), and research, design, and development. Malaysia must leverage this positioning.

Emulating success stories in Taiwan and South Korea, Malaysia can stimulate more companies to adopt an entrepreneurial culture and become aggressive tech start-ups to form part of the supply chain. This requires support and appropriate incentives by the government and rigorous drive by the private sector. To provide the impetus, it is advocated that a research grant or fund by the Government will augur well to strengthen the subsector's foundation.

Figure 17 : Malaysia's E&E Subsector Five Decades and Beyond

The 1970s

Malaysia attracted E&E investments through labour-intensive projects aimed at reducing unemployment, supported by a businessfriendly government. Manufacturers concentrated on simple E&E components, semiconductor parts, and semi-knocked-down (SKD) electrical products.

The 1980s

As the local companies matured and gained experience, the industry's sophistication in machining equipment grew in tandem. The companies began to manufacture consumer electronics parts and components and took on assembly-related work. The surge of demand for consumer electronics ensured that E&E manufacturing was on an upward trajectory.

The 1990s

Companies began to establish design and development (D&D) centres to engage in semiconductor packaging development, manufacturing process development, and design activities. Among the manufactured goods that dominated the era were office and computer equipment – including disks – to cater to the booming PC market demand.

2010

Malaysia moved up the value chain. To stay competitive, E&E factories evolved from high-volume, low-mix operations to high-mix, low-volume operations. Wafer fabrication companies continued to establish and expand their facilities in Malaysia, further positioning the nation among the global top E&E exporters catering to the regional and global demand for semiconductors.

Current

The Government through MIDA has been encouraging manufacturers to establish more R&D and D&D centres, centres of excellence, global procurement centres, logistic centres, and OHQs in Malaysia. E&E manufacturers are currently exploring the business potential that can be derived from new growth areas such as E-Commerce, Automation, IoT, and AI, accelerating the move towards Industry 4.0 by society and industry alike. Today, IoT is pushing demand for more advanced semiconductor devices such as sensors, resistors, and transceivers, to help the industry to adopt digitisation and digitalisation aimed at improved productivity, profit, and competitiveness.

Future

The E&E manufacturing space is evolving, as more and more companies move into more knowledge-intensive, hi-tech, innovative, and higher-value-add activities. With the availability of a sophisticated talent pool – such as in the integrated circuit (IC) design segment – Malaysia is ready to shift forwards into the development of autonomous vehicles, smart machines, and robotics, among other things. AI provides huge future opportunities as the key technology that will drive the emergence of a fully-connected Industry 5.0 society and economy. AI's future dominance will help communities to make accurate decisions due to precise forecasting capabilities and business process optimisations. Future industry megatrends are forecast to be shaped heavily by the advancements made by Industry 4.0 pillars.

Source: MIDA

Figure 18 : EEPN Key Programmes in 2022

On Going	2022	
Buy Local & Vendor Development Waterfall effect and best practices (6 companies)	**E&E Industry 50 years' anniversary** Programs and collaborations to celebrate the E&E 50th Anniversary at National level and state level	**Awareness & Industry Related Webinars** All Webinars (on-going) on semiconductor and electronics industry topics (AI, Software, IR 4.0)
E&E Marketplace Malaysia (EEMM) portal Promote Malaysian companies to the world (to collaborate with MIDA and Matrade)	**National E&E Forum 2022** Q3 – Invite Global Keynote Speaker	**Artificial Intelligence for Universities** Collaboration between MIDA, Intel & MPC to transfer 'AI-based machine vision' knowledge to university lecturers and students.
Artificial Intelligence for SMEs Enhanced Enhanced program features an add-on FPGA card	**Supply Chain Study** 3-5 subsectors identified, start on Q3 2022	**Fact-Finding Missions to E&E Subsector** Collaboration between public and private sector for workforce, technology, and regulation
Talent Development Programme for School Leavers Industrial program for SPM school leaver while working - Train & Work	**SME Leadership Development** Introduce business coaching programmes to SMEs	**Technomart on E&E** Collaboration with MIGHT
NCER Technology Innovation Centre (NTIC) COEs Assist SMEs to develop & test product · Test and Automation Development COEs	**SEMICON SEA 2022** Celebration of Malaysia's 50thYear of Manufacturing Excellence in the E&E Industry	
MyReskill@Workforce Industrial Upskilling and Reskilling Program for unemployed and retrenched workforce	**E&E Roadmap 2022-2025 with programs**	
MyReskill@IoT Assist companies in the adoption of Industry 4.0 among the local industries		

Source: EEPN (2021)

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