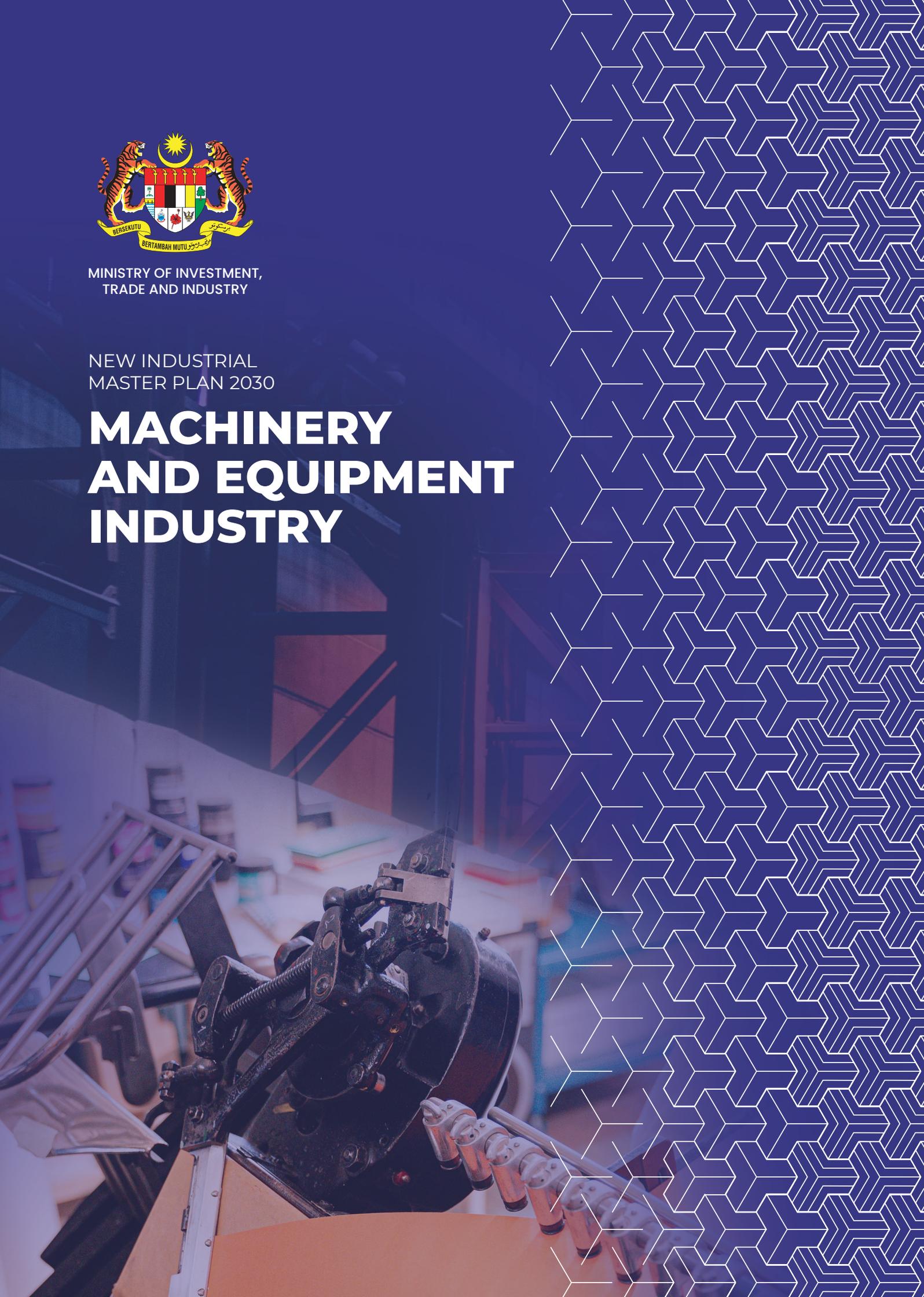


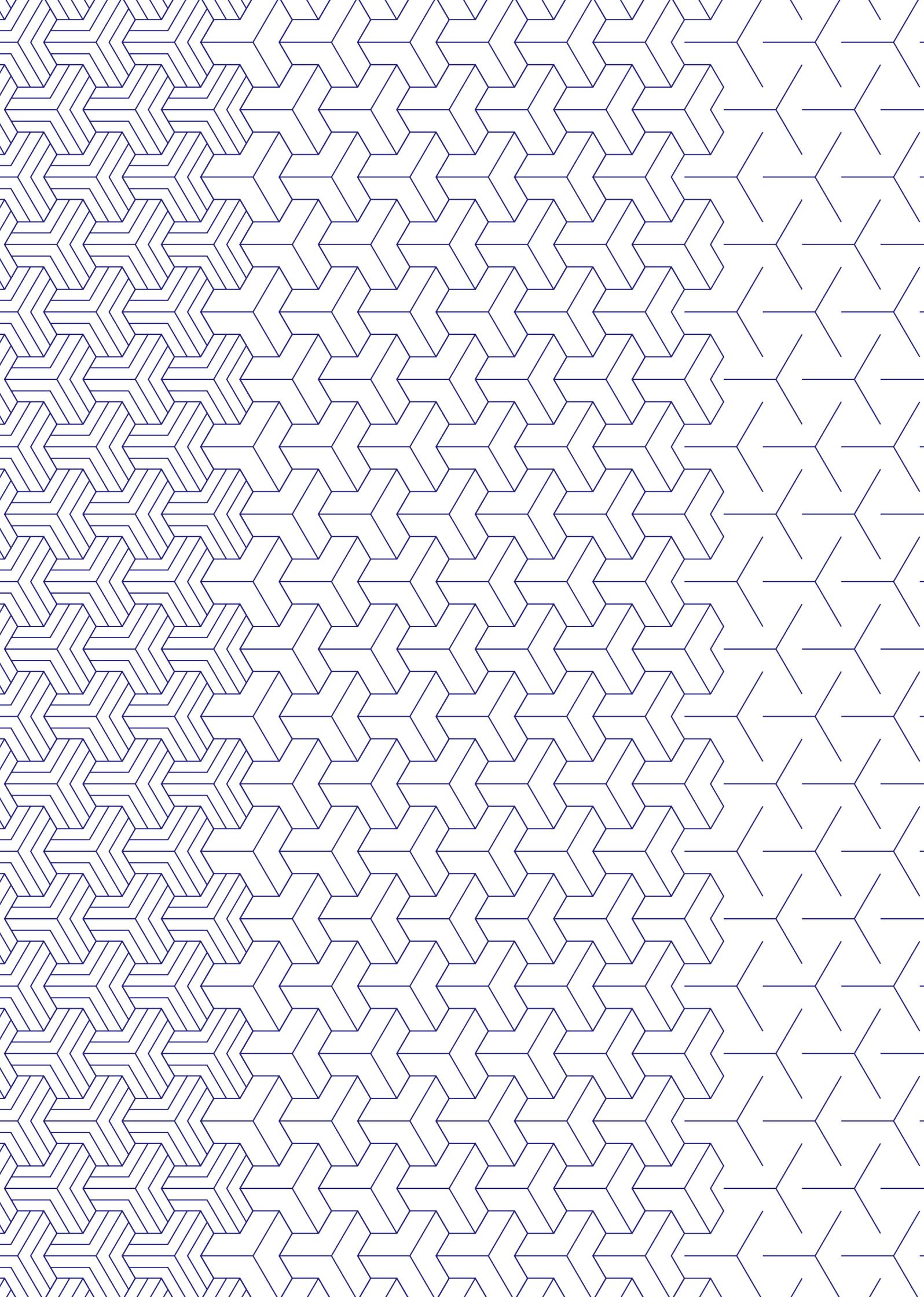


MINISTRY OF INVESTMENT,
TRADE AND INDUSTRY

NEW INDUSTRIAL
MASTER PLAN 2030

MACHINERY AND EQUIPMENT INDUSTRY





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PREFACE

Malaysia's strength in the manufacturing sector has been significantly driven by the implementation of robust and forward-thinking Industrial Master Plans, first launched in 1986.

The success of the IMP3 (2006-2020) was anchored on innovation, research and development (R&D) and human capital development to drive high value-added industries to transform Malaysia into a knowledge-based economy.

The journey towards formulating the NIMP 2030 is underscored by the need to build a robust industrial sector as an important prerequisite to achieve socioeconomic prosperity. Three previous iterations of the Industrial Master Plans have driven industrial development in Malaysia, with the Government adopting industrial development strategies relevant to the period to transform the economy. Malaysia flourished from a low-productivity agrarian-based economy and is heading towards achieving developed nation status, underpinned by robust manufacturing and services sectors. The strategy has successfully raised the living standards of the Rakyat and propelled remarkable growth in Gross National Income (GNI) per capita, increasing 34 times between 1967 to 2019, making Malaysia one of the fastest growing economies in modern history.

Industrial policies have since become more diverse and complex, incorporating new imperatives including the integration into the global value chain (GVC), development of indigenous capabilities in a knowledge economy, evolution of environmental, social and governance (ESG) criteria and disruptions from the new industrial revolution. The question is not about the necessity of such policies, but rather what new policies are required and how to proceed.

Given the current challenging environment, benchmarking and learning from other country's experiences are no longer sufficient. Malaysia needs to embark on its own path into uncharted territory, to steer the nation into the challenging future. The combined impact of the new imperatives and the recent pandemic has compelled the Government to rethink Malaysia's industrial strategy.

With the NIMP 2030, Malaysia intends to transform the industry into greater heights, capitalising on emerging global trends, supply chain disruptions, current geopolitical landscape, digitalisation and ESG considerations. These trends are moving at an unprecedented pace and Malaysia has to act fast.

Therefore, the NIMP 2030 is designed to achieve the aspirations in a span of seven years and takes on a Mission-based approach for industrial development. This approach unites Malaysia by encouraging collaboration between the Government and the private sector to rally the industries.

Purpose of the NIMP 2030

The NIMP 2030 sets forth Malaysia's future direction in industrial transformation. It provides a national integrated plan for resilient industrial development until 2030 – setting the fundamentals for future policy development and enabling the industry at all levels. It articulates Malaysia's position and participation in the global economic environment.

The NIMP 2030 serves to:

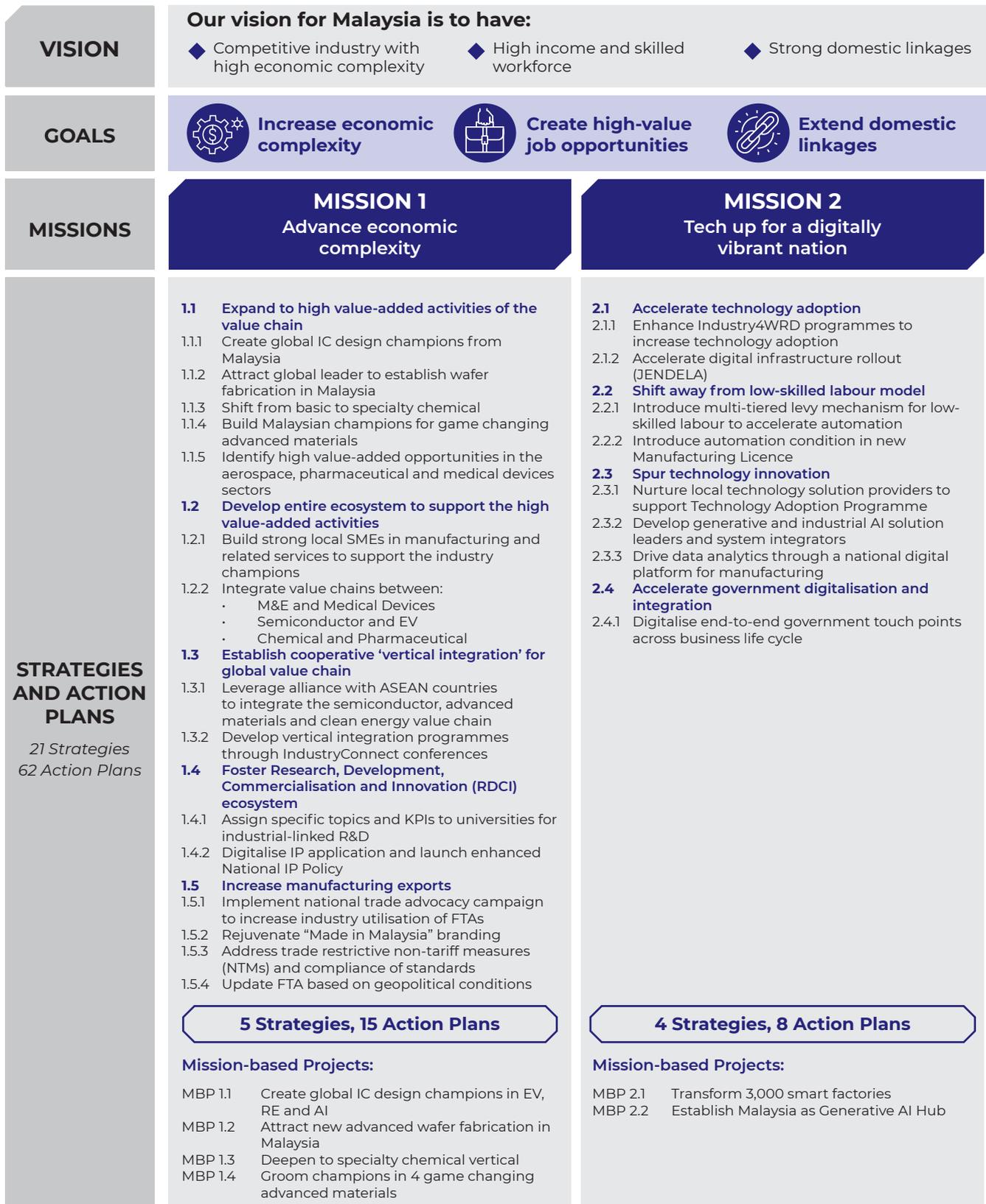
- Provide national strategic direction to lead the industrial development policies;
- Be a conversation piece for investors and other economies on Malaysia's position and direction; and
- Feature the role of the Malaysian Government in shaping the economy.

INTRODUCTION

New Industrial Master Plan 2030

The Missions and Enablers identified will be executed through 21 Strategies and 62 Actions Plans to unlock the needed enabling ecosystems. Several catalytic Mission-based

Projects (MBPs) have been identified to catapult the mission-based implementation. The NIMP 2030 strategic framework is illustrated below:



◆ New and existing industry clusters

◆ Balanced and inclusive participation

◆ Sustainable development

**Develop new & existing clusters****Improve inclusivity****Enhance ESG practices****MISSION 3**
Push for Net Zero**MISSION 4**
Safeguard economic security and inclusivity**ENABLERS****3.1 Accelerate transition towards sustainable practices**

- 3.1.1 Develop sectoral decarbonisation pathways to guide transition
- 3.1.2 Decarbonise "hard-to-abate" sectors
- 3.1.3 Introduce carbon policy, accounting and tax
- 3.1.4 Launch iESG framework and transition programmes

3.2 Transition to renewable and clean energy

- 3.2.1 Enhance adoption scheme for energy efficiency or renewable energy
- 3.2.2 Accelerate availability and accessibility of renewable energy source for the industry

3.3 Catalyse new green growth areas

- 3.3.1 Catalyse EV as a key growth driver
- 3.3.2 Grow carbon capture, utilisation and storage (CCUS) as a new sector
- 3.3.3 Develop circular economy framework for the industry

3.4 Shift towards green infrastructure

- 3.4.1 Accelerate transformation of industrial estates into eco-industrial parks

4.1 Develop resilient supply chain

- 4.1.1 Identify specific supply chain resilience strategies for critical sectors
- 4.1.2 Establish supply chain cooperation and collaboration through G2G and G2B programme
- 4.1.3 Introduce National Mineral Policy for downstream processing of critical minerals

4.2 Foster climate resilient development

- 4.2.1 Develop sectoral adaptation pathways
- 4.2.2 Foster an adaptation industry to provide adaptation products and services (including exports)
- 4.2.3 Instil climate resilience measures for critical economic infrastructure

4.3 Strengthen industrial clusters for regional development

- 4.3.1 Expand clusters for spillover regional impact
- 4.3.2 Align industrial development plan between Federal and States

4.4 Empower Bumiputera participation and create inclusive workforce

- 4.4.1 Uplift capabilities of *Bumiputera* companies in manufacturing via *Tindakan Pembangunan Bumiputera 2030*
- 4.4.2 Develop programme to increase women participation in high-skilled manufacturing employment

E.1 Mobilise financing ecosystem

- E.1.1 Introduce NIMP Industrial Development Fund and NIMP Strategic Co-Investment Fund
- E.1.2 Boost financing for digitalisation and decarbonisation transition
- E.1.3 Establish green *sukuk* to facilitate transition
- E.1.4 Establish supply chain financing for SMEs
- E.1.5 Increase utilisation of the capital market
- E.1.6 Expand the imSME platform to show all available funding options including government funding and capital market
- E.1.7 Review government funding for consolidation

E.2 Foster talent development and attraction

- E.2.1 Leverage mynext and MYFutureJobs for strategic workforce planning to address long-term demand-supply requirement
- E.2.2 Introduce progressive wage system policy
- E.2.3 Improve policy to enable fast and hassle-free access to high-skilled foreign talents
- E.2.4 Expand TVET programmes for high-skilled jobs in critical sectors
- E.2.5 Raise profile of high-tech manufacturing career to attract interest in STEM subjects

E.3 Establish best-in-class investor journey for ease of doing business

- E.3.1 Establish a unified investment strategy and align investment evaluation to new parameters under NIA
- E.3.2 Harmonise and streamline functions and KPIs across IPA landscape
- E.3.3 Review and design competitive, agile and relevant incentives
- E.3.4 Improve One-Stop Portal for seamless investor experience

E.4 Introduce whole-of-nation governance framework

- E.4.1 Establish public-private collaborative councils
- E.4.2 Set up NIMP 2030 Delivery Management Unit
- E.4.3 Develop NIMP 2030 dashboard system

4 Strategies, 10 Action Plans**Mission-based Projects:**

- MBP 3.1 Create decarbonisation pathway role models
- MBP 3.2 Launch locally-manufactured EV
- MBP 3.3 Deploy large-scale CCUS solutions

4 Strategies, 10 Action Plans**4 Strategies, 19 Action Plans**

NIMP 2030 SECTORAL PLAN

There are individual enclosures of 21 sectors included as a supplementary reference to the main NIMP 2030 document.

They provide a view of the respective sectoral perspective in the context of the main NIMP 2030 document, and were developed with reference to individual sectoral roadmaps, where applicable.

The 21 sectors are:

| Category | Industry |
|-------------------------|---|
| Priority Sectors | <ol style="list-style-type: none"> 1. Aerospace 2. Chemical 3. Electrical and Electronics (E&E) 4. Pharmaceutical 5. Medical Devices |
| Sectors | <ol style="list-style-type: none"> 6. Digital and Information and Communication Technology (ICT) 7. Automotive 8. Food Processing 9. Global Services and Professional Services 10. <i>Halal</i> 11. Machinery and Equipment (M&E) 12. Manufacturing-Related Services (MRS) 13. Metal 14. Mineral 15. Palm Oil-based Products 16. Petroleum Products and Petrochemicals 17. Rail 18. Rubber-based Products 19. Shipbuilding and Ship Repair (SBSR) 20. Textile, Apparel and Footwear 21. Wood, Paper and Furniture |

This document is the [NIMP 2030 Sectoral Plan – Machinery and Equipment Industry](#).

OVERVIEW OF THE DOCUMENT

This NIMP 2030 Sectoral Plan – Machinery and Equipment Industry (Document) provides insights into the sector and its prospects during the NIMP 2030 period.

This Document offers a comprehensive understanding of the industry's direction during the NIMP 2030 period based on its historical performance, opportunities and strategies to overcome existing challenges and achieve its targets.

The Document is presented in five sections:

1. Background

- This section sets the foundation to help readers understand the industry.
- It delves into the industry's focus area, encompassing its sub-sectors, for a comprehension of the industry's breadth.¹
- Readers will find details about the industry's value chain and its key players, including the relevant industry associations, in this section.
- The section lists the policies that are related to the industry.

2. Performance

- This section reports the industry's performance during specific periods.
- There are two notable periods for the review of the industry's historical performance:
 - the IMP3 period (2006 to 2020); and
 - from 2021 to 2022.
- The performance review of the industry's development includes its investment trends, export and import dynamics, employment figures, value-added and productivity measures.

3. Trends and Opportunities

- This section highlights the opportunities and potential avenues for growth that the industry can leverage during the NIMP 2030 period.

4. Challenges

- This section provides insights into potential obstacles that could impact the industry's growth and development.

5. Strategies and Action Plans

- The final section of the document outlines the future trajectory for the industry.
- This section provides the Strategies and Action Plans that are intended to catalyse the industry during the NIMP 2030 period.
- The Strategies and Action Plans set in this Document have been aligned to the Missions set in the main NIMP 2030 document.

¹ Incentives available for this industry as of time of writing can be found in Appendix 1

SECTION 1 BACKGROUND

Areas Covered

1. Machinery and Equipment (M&E) industry refers to the manufacturing of hardware/software/ machinery and its components or equipment to be operated for other industries to produce products or provide services.
2. The M&E industry has four main sub-sectors (Table 11.1).

Table 11.1: Sub-sectors of M&E Industry

| Category | Description |
|--|---|
| i. General Industrial Machinery and Equipment, Components and Parts | Manufacturing of general-purpose M&E and related parts which cover a broad category of products such as heating and cooling equipment, material handling equipment, factory automation, tools and apparatus, pumps, compressors, transmission shafts, etc |
| ii. Specialised Machinery and Equipment for Specific Industries | Manufacturing of M&E and related parts which are specifically designed and customised for use in a specific industry or process, etc. |
| iii. Power Generating Machinery and Equipment | Manufacturing of M&E and related parts for power generation which comprises mainly of steam or other vapour-generating boiler, turbines, engines and motors, etc. |
| iv. Machine Tools and Metalworking Machinery and Equipment | Manufacturing of machine-tools and related parts for working metal or other materials |

Source: Malaysian Investment Development Authority (MIDA)

3. The industry is supported by the Engineering Supporting Industries (ESI) activities which complement the industry's growth and have eight main sub-sectors (Table 11.2).

Table 11.2: Sub-sectors of ESI

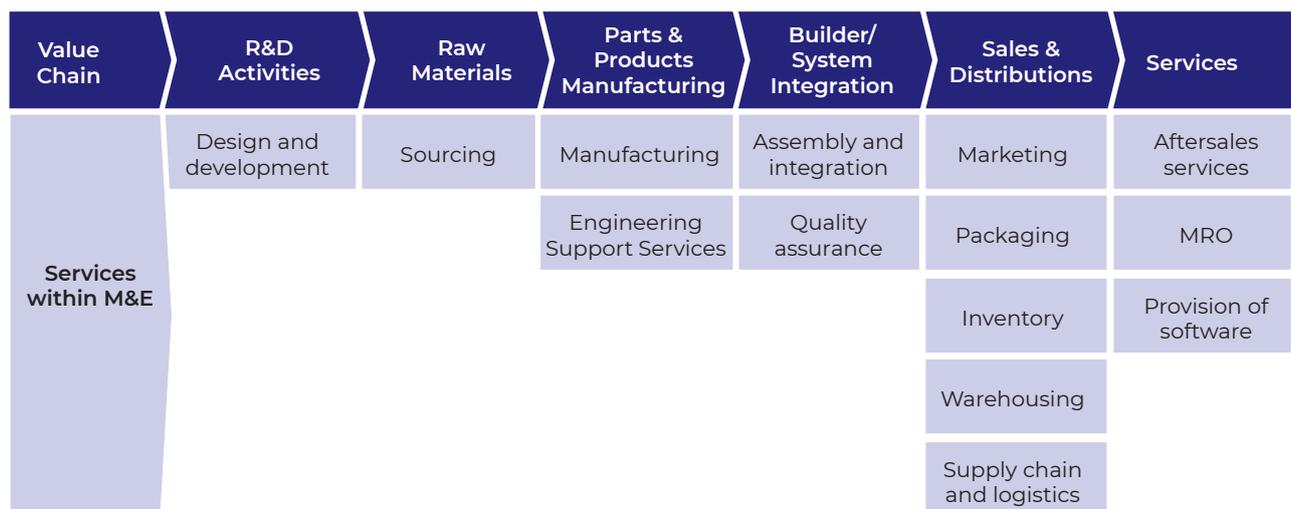
| Category | Description |
|--------------------------------|---|
| i. Mould and Dies | Mould, dies and tooling manufacture for the application of various manufacturing sector |
| ii. Machining | Removal process of material based on the designed and desired shape |
| iii. Metal Casting | Moulding process of molten metal to produce geometrically complex part |
| iv. Surface Engineering | Process of alteration to improve surface properties and reduce degradation |
| v. Heat Treatment | Application of heating and cooling process to improve the physical and chemical properties |
| vi. Metal Forging | Application of compressive force to reshape the metal |
| vii. Metal Stamping | Application of stamping press of the sheet metal to produce desire shape from the die surface |
| viii. Metal Fabrication | Process of cutting, bending and assembling work to build metal structures |

Source: MIDA

Value Chain

4. The value chain of the Malaysian M&E industry (Figure 11.1) encompasses a range of critical activities and supporting ecosystems including:
 - i. research and development (R&D) activities;
 - ii. acquisition of raw materials;
 - iii. manufacturing of parts and products; and
 - iv. sales, distribution and services of M&E products, including decommissioning services.

Figure 11.1: Value Chain of M&E Industry



Source: Ministry of Investment, Trade and Industry (MITI)

5. ESI support M&E manufacturers in the manufacturing segment of the value chain and provide strong spillover to other sectors.

Market Players

6. Malaysia's M&E industry and ESI have over 2,500 players.
 - i. Of these, 500 are large multinational corporations (MNC) and small and medium enterprises (SME) in the general industrial M&E, components and parts sub-sector.
 - ii. The specialised M&E for specific industries sub-sector has over 400 MNC and SME.
 - iii. The power generating M&E sub-sector has approximately 50 companies, and the machine tools and metalworking machinery sub-sector has approximately 30 companies
 - iv. The breakdown of the ESI by sub-sector is as follows:
 - a. mould and die – 446 companies;
 - b. machining – 325 companies;
 - c. metal casting – 95 foundries;
 - d. surface engineering – 125 companies;
 - e. heat treatment – 17 companies;
 - f. forging – 8 companies;
 - g. metal stamping – 148 companies; and
 - h. metal fabrication – 800 companies.

7. Figure 11.2 illustrates the presence of industry players in the current landscape of the value chain.
- Majority of industry players are involved in the manufacturing, sales and distribution as well as services segments of the value chain.
 - There are limited R&D activities in machine tools and metalworking machinery sub-sector.
 - Apart from that, there is limited participation of industry players in the raw materials segment in general.

Figure 11.2: Presence of Industry Players along the Value Chain of M&E Industry

| Value Chain | R&D Activities | Raw Materials | Parts & Products Manufacturing | Builder/ System Integration | Sales and Distributions | Services |
|--|-----------------|---------------|--------------------------------|-----------------------------|-------------------------|-----------------|
| General Industrial M&E, Components and Parts | Medium Presence | Low Presence | Medium Presence | No Presence | Medium Presence | Medium Presence |
| Specialised M&E for Specific Industries | Medium Presence | Low Presence | Medium Presence | Medium Presence | Medium Presence | Medium Presence |
| Power Generating M&E | Medium Presence | Low Presence | Medium Presence | Medium Presence | Medium Presence | Medium Presence |
| Machine Tools and Metalworking M&E | Low Presence | Low Presence | Medium Presence | Low Presence | Medium Presence | Medium Presence |

Source: MIDA

8. M&E industry's operations are concentrated in three regions – Penang, Klang Valley and Johor.
9. M&E industry associations in Malaysia play important roles in representing the interest of manufacturers, influencing regulations and safeguarding the welfare of manufacturers and consumers, which include:
- Machinery and Engineering Industries Federation (MEIF);
 - Machinery and Equipment Manufacturers Association (MEMA);
 - Malaysian Association of Technical Analysts (MATA);
 - Malaysian Special Tooling and Machining Association (MSTMA);
 - Penang Foundry & Engineering Industries Association (PENFEIA);
 - The Selangor & Kuala Lumpur Foundry and Engineering Industries Association (SFEIA);
 - Malaysian Air-Conditioning and Refrigeration Association (MACRA); and
 - Malaysian Iron and Steel Industry Federation (MISIF).

SECTION 2 PERFORMANCE

IMP3 Focus and Performance

10. During the period of the IMP3 (2006 to 2020), the industry was focused on the development of:
 - i. high technology M&E; and
 - ii. specialised M&E for specific industries.
11. As a result, the M&E industry's contribution to Gross Domestic Product (GDP) grew by a CAGR² of 7.2 per cent, from RM4.8 billion (2006) to RM14.0 billion (2020).³
12. The industry encompasses high technology manufacturing and modern services sectors, utilising high skilled talents – with 70.0 per cent of employment opportunities in the managerial, supervisory and technical levels.
13. During this period, Malaysia was the leading manufacturer in Southeast Asia region for pressure vessels, process equipment and modules for the chemical, petrochemical, and oil and gas industries.
14. Apart from that, Malaysia was among the largest exporters in the region and recognised as a major supplier of:
 - i. high-speed heavy lifting tower;
 - ii. pedestal cranes;
 - iii. process automation;
 - iv. air-conditioning plant;
 - v. tower cranes; and
 - vi. port cranes.

Investments

15. The investment performance (2006 to 2022) of the M&E industry is recorded in Table 11.3.

Table 11.3: Approved Investments of the M&E Industry

| Items | Units | IMP3 | | | 2021 | 2022 | 2021-2022 |
|----------------------------|------------|-------|-------|-----------|-------|-------|-----------|
| | | 2015 | 2020 | 2015-2020 | | | |
| Total Investment | RM billion | 2.4 | 7.8 | 45.1 | 2.5 | 9.7 | 12.2 |
| Domestic Investment | RM billion | 1.2 | 2.8 | 22.2 | 1.2 | 3.7 | 4.9 |
| Foreign Investment | RM billion | 1.2 | 5.0 | 22.9 | 1.3 | 6.0 | 7.3 |
| Number of projects | # | 207 | 146 | 2,214 | 103 | 126 | 229 |
| Employment | persons | 9,693 | 6,382 | 115,462 | 4,660 | 8,016 | 12,676 |

Source: MIDA

² Compound annual growth rate

³ 2006 GDP data is based on constant 2005 prices, while 2020 data is based on constant 2015 prices and includes machinery and equipment, other manufacturing and repair and installation of machinery and equipment

16. During the IMP3, a total of 2,214 projects were approved in the M&E industry with total investment of RM45.1 billion. These investments committed 115,462 job opportunities.
17. In 2021 and 2022, a total of 229 projects were approved with a total investment of RM12.2 billion. These investments committed a total of 12,676 job opportunities.
18. Overall, investment in the M&E industry had grown since 2006 as the industry evolved and increased product value, through the production of complex products.
19. From 2006 to 2022, 2,019 (82.6 per cent) of the 2,443 approved projects were implemented.

Exports

20. Export performance (2006 to 2022) of the M&E industry is depicted in Table 11.4.

Table 11.4: Exports of M&E Industry

| Item | IMP3 | | | 2021 | 2022 | 2006-2020 | 2020-2021 | 2021-2022 |
|-----------------------------|------|------|-----------|------|------|-----------|---------------|-----------|
| | 2006 | 2020 | 2006-2020 | | | CAGR | Annual Growth | |
| Exports (RM billion) | 20.5 | 39.4 | 446.0 | 49.9 | 60.4 | 4.8% | 26.6% | 21.0% |

Source: Department of Statistics Malaysia (DOSM)

21. During the IMP3 period, total exports grew by a CAGR of 4.8 per cent from RM20.5 billion (2006) to RM39.4 billion (2020).
22. In 2021 and 2022, exports grew by 26.6 per cent and 21.0 per cent, amounting RM 49.9 billion and RM60.4 billion respectively.
23. The industry experienced strong growth in exports primarily due to the presence of an anchor company and companies specialising in cutting-edge products such as:
 - i. semiconductors;
 - ii. sophisticated machinery;
 - iii. state-of-the-art measurement and analysis laboratory equipment;
 - iv. robotics; and
 - v. self-driving vehicles.
24. In 2022, major export destinations included:
 - i. Singapore (RM16.3 billion, 27.0 per cent);
 - ii. United States (US) (RM7.4 billion, 12.3 per cent);
 - iii. China (RM3.9 billion, 6.4 per cent);
 - iv. Indonesia (RM3.7 billion, 6.2 per cent); and
 - v. Thailand (RM2.8 billion, 4.7 per cent).

25. In 2022, major export of M&E products included:
- semiconductor machinery and equipment (RM14.2 billion, 23.5 per cent);
 - pumps (RM5.7 billion, 9.3 per cent);
 - machines specialised for specific industries (RM5.5 billion, 9.1 per cent);
 - air-conditioning machines (RM4.6 billion, 7.7 per cent); and
 - valves (RM2.8 billion, 4.7 per cent).

Imports

26. Import performance of the M&E industry (2006 to 2022) is presented in Table 11.5.

Table 11.5: Imports of M&E Industry

| Item | IMP3 | | | 2021 | 2022 | 2006-2020 | 2020-2021 | 2021-2022 |
|-----------------------------|------|------|-----------|------|------|-----------|---------------|-----------|
| | 2006 | 2020 | 2006-2020 | | | CAGR | Annual Growth | |
| Imports (RM billion) | 37.8 | 60.1 | 825.6 | 68.6 | 89.4 | 3.4% | 14.2% | 30.2% |

Source: DOSM

27. During the IMP3 period, total imports grew by a CAGR of 3.4 per cent from RM37.8 billion (2006) to RM60.1 billion (2020).
28. In 2021 and 2022, imports grew by 14.2 per cent and 30.2 per cent to RM68.6 billion and RM89.4 billion respectively.
29. The increase of imports was attributed to the increased demand in other industries as well as investments in infrastructure projects, creating demand for M&E products.
30. In 2022, major import countries included:
- China (RM30.6 billion, 34.2 per cent);
 - Japan (RM10.3 billion, 11.5 per cent);
 - US (RM9.4 billion, 10.5 per cent);
 - Singapore (RM7.4 billion, 8.2 per cent); and
 - Germany (RM5.4 billion, 6.0 per cent).
31. In 2022, majority of M&E imports were advanced, high-tech machines and components including:
- semiconductor machinery and equipment (RM10.5 billion, 11.7 per cent);
 - pumps (RM9.2 billion, 10.3 per cent);
 - specialised machineries (RM6.3 billion, 7.1 per cent);
 - rotating electric plant and parts (RM5.0 billion, 5.6 per cent); and
 - internal combustion piston engines and parts (RM5.0 billion, 5.6 per cent).

Value-added

32. The M&E industry's value-added (GDP) is recorded in Table 11.6 below.

Table 11.6: Value-added of M&E Industry

| Item | IMP3 | | 2021 | 2022 | 2006-2020 | 2020-2021 | 2021-2022 |
|---|------|------|------|------|-----------|---------------|-----------|
| | 2006 | 2020 | | | CAGR | Annual Growth | |
| Value-added⁴ (RM billion) | 4.8 | 14.0 | 15.0 | 16.1 | 7.9% | 7.6% | 6.9% |

Source: DOSM

33. During the IMP3 period, the industry's GDP contribution grew by a CAGR of 7.9 per cent from RM4.8 billion (2006) to RM14.0 billion (2020).
34. In 2021 and 2022, the industry's GDP contribution grew further by 7.6 per cent and 6.9 per cent to RM15.0 billion and RM16.1 billion respectively.
35. The growth of the industry was driven by the shift from general fabrication and machining works to assembly of higher-end machinery, such as heavy machinery and precision components manufacturing.

Employment

36. The M&E industry's employment for the period of 2019 to 2022 is tabulated below (Table 11.7).

Table 11.7: Employment in M&E Industry

| Item | IMP3 | | 2021 | 2022 | 2019-2022 |
|---|--------|--------|--------|--------|-----------|
| | 2019 | 2020 | | | CAGR |
| Employment⁵ (persons) | 91,161 | 91,983 | 92,969 | 96,289 | 1.8% |

Source: DOSM

37. Employment grew by a CAGR of 1.8 per cent from 91,161 persons (2019) to 96,289 persons (2022).
38. The growth in employment was driven by increased investment in infrastructure, growing manufacturing sector and export demand.

Labour Productivity

39. The M&E industry's labour productivity for the period of 2019 to 2022 is tabulated in Table 11.8.

⁴ Value-added is measured by the GDP of the industry; 2006 GDP data is based on constant 2005 prices, while 2020 to 2022 data are based on constant 2015 prices

⁵ This employment data is based on Monthly Manufacturing Statistics December 2022. Due to the change in methodology for employment statistics tabulation in 2019, industry's employment breakdown from 2006 to 2018 is not available

Table 11.8: Labour Productivity of M&E Industry

| Item | IMP3 | | 2021 | 2022 | 2019-2022 |
|--|---------|---------|---------|---------|-----------|
| | 2019 | 2020 | | | CAGR |
| Labour Productivity ⁶ (RM) | 155,305 | 152,488 | 162,316 | 167,579 | 2.6% |

Source: DOSM

40. The labour productivity of the industry has grown by a CAGR of 2.6 per cent from RM155,305 (2019) to RM167,579 (2022).
41. Overall, the growth in labour productivity was driven by automation and digitalisation initiatives.

Research and Development

42. During the IMP3 period, the Machinery Technology Centre (MTC), situated in SIRIM Rasa, Hulu Selangor was established, specialising in three key technological domains within the M&E sector – machine design, foundry and tooling.
43. The objective of MTC is to enhance the technological and innovative capabilities of SME in Malaysia by facilitating the adoption of advanced technologies, thereby enabling SME to improve their productivity.
44. Apart from the MTC, the Industrial Centre of Innovation – Smart Manufacturing situated in Bukit Jalil, Kuala Lumpur focuses on six main clusters, of which three are applicable for M&E:
- additive manufacturing and computer aided engineering;
 - control and instrumentation; and
 - mechanical engineering.

⁶ Annual labour productivity is derived from value added per employment

SECTION 3 TRENDS AND OPPORTUNITIES

45. Outlook for the M&E industry varies across the sub-sectors and are highly dependent upon the structural trends of its respective end customers.
46. Power generating M&E is expected to have the fastest growth rate of 8.7 per cent annually to 2027, driven by increasing energy demands from various industries.
 - i. Malaysia is currently the largest manufacturing hub in Southeast Asia region.
 - ii. There are opportunities for local players to provide refurbishing services for industrial turbines and generators.
 - iii. As demand for environmental-friendly and cost-effective energy increases, this sub-sector is expected to shift towards energy efficient solutions such as water and wind turbines as well as photovoltaic power generating systems.
47. General Industrial M&E is anticipated to grow at 8.0 per cent annually to 2027. The growth is driven by increasing demand for automation to maintain competitiveness as labour costs and quality requirements increase.
48. Metalworking is forecasted to grow at 7.3 per cent annually to 2027. There is a need to develop the machine tools sub-sector in Malaysia as this will play a key role in supporting high-tech industries including E&E, aerospace and medical devices.
49. Specialised M&E is anticipated to grow at 7.2 per cent annually to 2027, driven by strong demand for specialised, high-precision and automated M&E in targeted industries including electrical and electronics (E&E), food and beverages (F&B), rubber, palm oil and automotive.
50. Apart from that, there are opportunities to improve capabilities in ESI (Table 11.9).

Table 11.9: ESI Capabilities and Opportunities

| ESI Sub-sectors | Existing Capabilities | Opportunities |
|---------------------------|---|---|
| i. Mould and Dies | <ul style="list-style-type: none"> • Precision specifications by international semiconductor industry requirements for end-user industry e.g. automotive, E&E etc. | <ul style="list-style-type: none"> • High precision mould and dies for E&E industry • Large moulds (>10mt) for automotive, plastic industries etc. |
| ii. Machining | <ul style="list-style-type: none"> • Free-form machining • Precision level up to 5 micron • Large format machining >5 meter | <ul style="list-style-type: none"> • Ultra-precision machining • Exotic materials machining • Laser beam machining • Machining for hi-tech industries |
| iii. Metal Casting | <ul style="list-style-type: none"> • Mass production of high-pressure and low-pressure die casting • End-user industry: Automotive, telecommunication etc. | <ul style="list-style-type: none"> • Large component casting • Custom-made sand casting |

Table 11.9: ESI Capabilities and Opportunities

| ESI Sub-sectors | Existing Capabilities | Opportunities |
|--------------------------------|--|--|
| iv. Surface Engineering | <ul style="list-style-type: none"> • Electroplating • Electroless electroplating and anodising • Hard Chroming • High precision physical vapor deposition, plasma-enhanced chemical vapor deposition and chemical vapor deposition • High precision powder and spray painting | <ul style="list-style-type: none"> • Specialised coating for hi-end industry • Thermal spray coating • Specialty metal coatings • Ceramic coatings |
| v. Heat Treatment | <ul style="list-style-type: none"> • Carburising • Nitriding • Vacuum Handling • Quenching • Annealing • Normalising • Tempering | <ul style="list-style-type: none"> • Specialty heat treatment process for hi-tech industries |
| vi. Metal Forging | <ul style="list-style-type: none"> • Small (<10mt) parts • Hot and cold forging • Cold forging | <ul style="list-style-type: none"> • Large forging for hi-tech industries • Open forging |
| vii. Metal Stamping | <ul style="list-style-type: none"> • High precision stamping • Progressive stamping • mechanical press machines ranging from 30 to 1300 mt | <ul style="list-style-type: none"> • Processes improvement to cater for latest demand/ industry technology requirement |
| viii. Metal Fabrication | <ul style="list-style-type: none"> • Large sheet metals processing | <ul style="list-style-type: none"> • Specialty fabrication for high-tech industries |

Source: MIDA

System Integration

51. The M&E industry presents a significant opportunity for businesses to optimise their production facilities and boost productivity.
52. Technologies such as predictive maintenance and Industrial Internet of Things (IIoT) can help increase output while reducing labour-intensive operations. These automation features require system integration to work effectively.
53. Apart from that, manufacturers can achieve greater efficiency and accuracy in their operations by integrating advanced technology features such as additive manufacturing (3D, 4D and 5D printing), smart manufacturing and supervisory control and data acquisition (SCADA).
54. As a result, there is a growing demand for M&E solutions providers who can offer end-to-end solutions that include equipment installation, system integration as well as maintenance and support services.

55. This creates an opportunity for Malaysia to:
- i. establish anchor companies to play a key role in developing the M&E sector;
 - ii. encourage adoption of Industry 4.0 technologies;
 - iii. establish a manufacturing incubator programme; and
 - iv. create a regional cluster offering total manufacturing solutions.
56. Refer to Action Plan 1 (AP1), Action Plan 3 (AP3), Action Plan 4 (AP4) and Action Plan 7 (AP7) in Section 5 for strategies and action plans related to system integration and industry development.

Circular Economy

57. Upgrading facilities to produce high-performance M&E is a key area of opportunity in the manufacturing sector. This enables manufacturers to efficiently make products and manage end-of-life products by incorporating circular economy principles into their operations. This approach can reduce waste and increase the reuse of materials, which benefits both the environment and companies' profitability.
58. Apart from that, new business models focusing on retrofitting existing machinery and equipment are emerging. This provides an opportunity for the industry to transform their operations into sustainable and green ones.
59. It is essential for Malaysia to introduce a policy instrument to promote circular economy to achieve this.
60. Refer to Action Plan 6 (AP6) in Section 5 for the action plan related to circular economy.

SECTION 4 CHALLENGES

SME Competitiveness

61. MNC's reliance on foreign vendors can create barriers for local SME, such as difficulties in getting ownership of technologies and commercialising homegrown technologies. This hinders the growth and competitiveness of SME.
62. Apart from that, SME typically have limited resources to conduct R&D for innovation of products and processes, while research institutes have limited capabilities to engage in advanced R&D activities and provide technical support to local SME.
63. The private sector has relatively low R&D expenditure to drive local SME development and specialisation.
64. It is essential to create a level playing field for local SME and promote a vibrant and sustainable M&E industry in Malaysia. To achieve this, it is essential to:
 - i. establish a manufacturing centre focusing on product, process and technology development; and
 - ii. encourage SME to embark for Initial Public Offering (IPO) to gain access to capital and increased visibility in the market.
65. Refer to Action Plan 2 (AP2) and Action Plan 8 (AP8) in Section 5 for action plans related to SME competitiveness.

Talent

66. Talent upskilling is crucial for enhancing the competency of advanced operational systems in the manufacturing sector, as it transitions towards the Fourth Industrial Revolution (4IR).
67. In response to these changes, companies are shifting towards simulation and augmented reality to remotely showcase products and designs to potential customers.
68. However, the skills required for 4IR including interconnectivity and interoperability, demand a hands-on approach that involves using industrial-grade equipment in a factory setting.
69. Conventionally, Malaysian graduates are primarily equipped with theoretical knowledge but lack adequate industry exposure, resulting in a skill mismatch for the employers.
70. As such, it is essential to provide the necessary training and development opportunities to enhance the skills of M&E and ESI talent to meet the demands of 4IR and remain competitive.
71. This can be addressed by leveraging on open-source resource platforms for collaborative product development, which can facilitate knowledge sharing and skills transfer between industry players and academia.
72. By leveraging this platform, Malaysian graduates and industry players have access to a broader range of expertise and resources to increase proficiency in the M&E industry.
73. Refer to Action Plan 5 (AP5) in Section 5 for the action plan related to talent and open-source resource platform.

SECTION 5 STRATEGIES AND ACTION PLANS

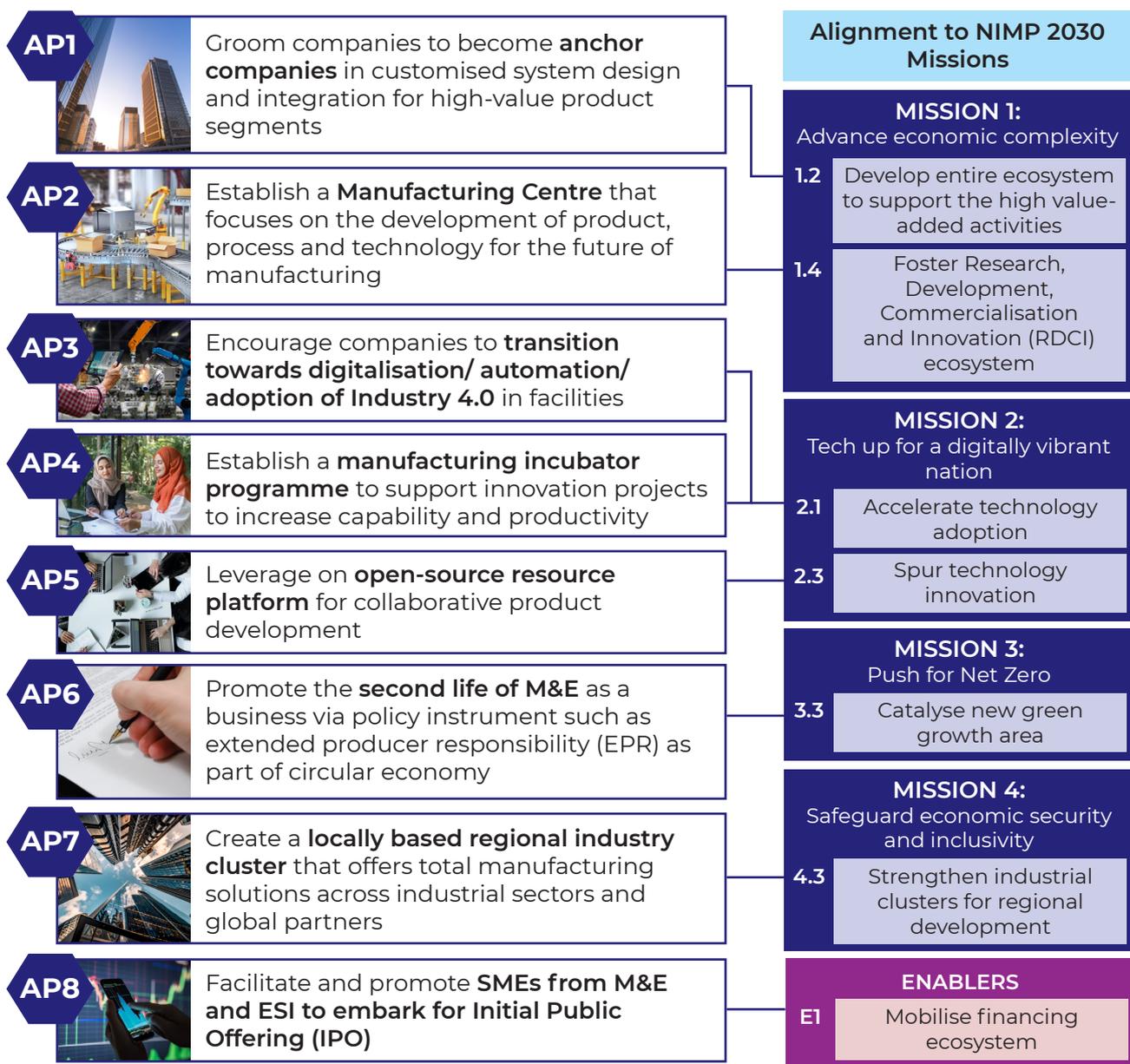
NIMP 2030 Focus

74. During the period of the NIMP 2030, the industry will focus on enhancing its manufacturing capabilities through:
- innovation and technology adoption;
 - collaboration and promoting sustainable practices; and
 - supporting the growth of SME.

Action Plans

75. Strategies and Action Plans relating to the NIMP 2030's Missions and Enablers are applicable to this industry (Figure 11.3).

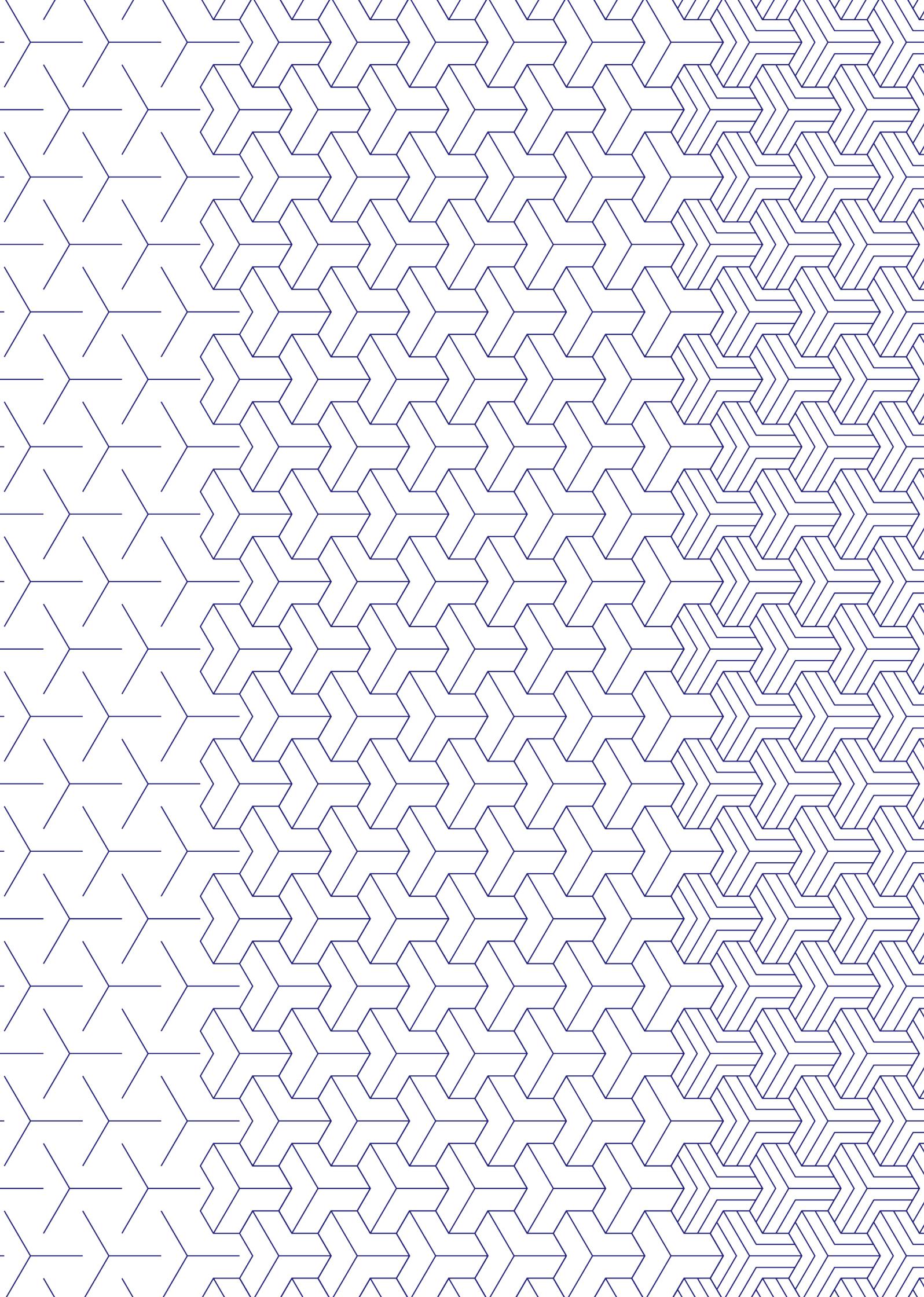
Figure 11.3: Strategies and Action Plans for M&E Industry

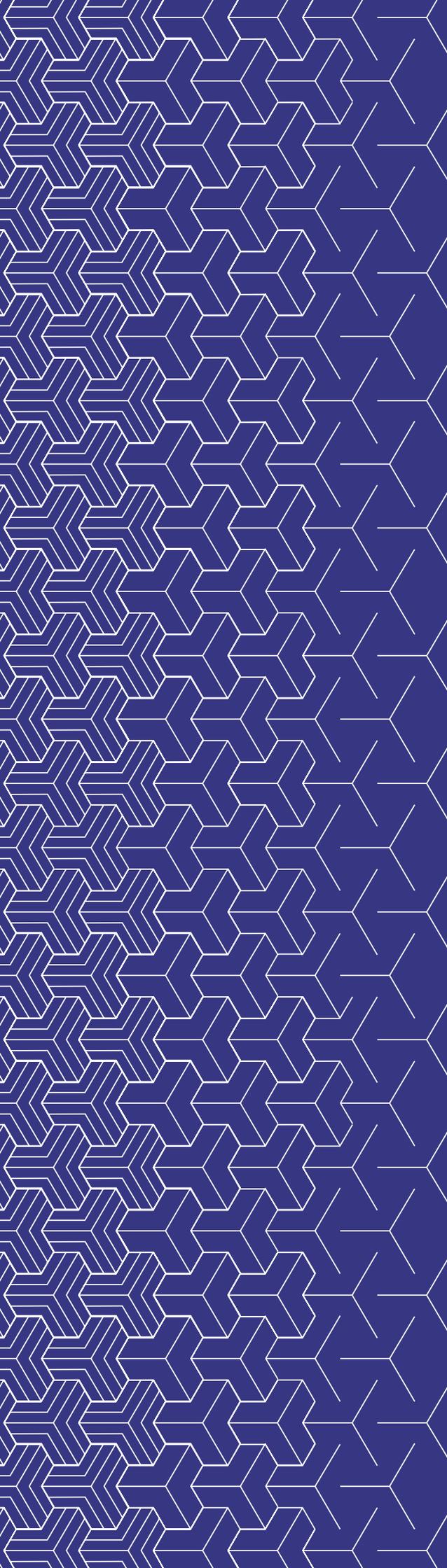


APPENDIX 1 INCENTIVES

There are a few incentives offered for key players of M&E industry, these include the following:

| Incentives | Agency |
|--------------------------------|---|
| Pioneer Status (PS) | Malaysian Investment Development Authority (MIDA) |
| Investment Tax Allowance (ITA) | |





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