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Boosting Productivity

Accelerating Transition into
Fourth Industrial Revolution



SUBSECTOR PRODUCTIVITY REPORT

MACHINERY AND EQUIPMENT





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Subsector Productivity Report Machinery and Equipment

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Executive Summary

The subsector report for Machinery and Equipment by Machinery and Equipment Productivity Nexus (MEPN) details MEPN's initiatives to take the subsector's productivity growth to the next level by impacting progress at the sectoral and enterprise level. An overall look into the M&E subsector in Malaysia is presented in the first part of the report, among others, in terms of its industry profiling, contribution to Malaysia's Gross Domestic Product (GDP), productivity growth performance, and employment.

This report details the challenges faced in the M&E subsector, mainly in the existing conventional way of doing business, lack of skilled talent to cater for the industry's demand, and expensive resources

for product testing, research and development (R&D), expansion, as well as product development. MEPN has realised initiatives since 2017 to drive the subsector's productivity and competitiveness in mitigating these challenges. MEPN's past, present, and recommendations for future productivity initiatives are presented to paint a comprehensive picture of MEPN's role in boosting the productivity growth of the M&E subsector.

In setting MEPN's way forward, the Nexus is guided by Malaysia Productivity Blueprint (MPB) and the newly launched Twelfth Malaysia Plan.

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

“In achieving the aspiration of the Twelfth Malaysia Plan (12MP) to rejuvenate all the economic sectors over the next five years in resetting the country’s economy, Malaysia Productivity Corporation (MPC) is committed to amplifying efforts to boost productivity growth”



MPC has been mandated to drive Malaysia’s productivity growth to a new level. Given the contraction in productivity growth recorded in 2020 due to the impact of COVID-19 pandemic, MPC has strategised and renewed initiatives and programmes to impact growth fast and swift.

As envisioned in 12MP, sectoral productivity nexus established through the mandate from Malaysia Productivity Blueprint (MPB) will be further leveraged to affect productivity growth of the Services, Manufacturing, and Agriculture sectors. Guided by the plan, existing initiatives by the nexus will be rationalised to ensure better impacts to industry. New initiatives will be introduced and ineffective programmes will be revised to maximise allocation of resources efficiently. Two new productivity nexus has been introduced, namely Construction and Logistics productivity nexus to heighten growth in these two subsectors. MPC is affirmative to support and facilitate productivity nexus’ initiatives by maximising multi-platforms collaboration.

In boosting the productivity growth of the manufacturing sector, Machinery and Equipment Productivity Nexus (MEPN) will strengthen its role in accelerating productivity in machinery and equipment subsector. The subsector plays an important function in materialising the goals set in the National Policy on IR4.0 (Industry4WRD) to position Malaysia as a major solutions provider for the manufacturing sector in the Asia Pacific region by 2025.

High impact initiatives are set in motion by MEPN to affect productivity growth at the sectoral and enterprise level. This report gives an overall understanding of MEPN’s role and indicates its future direction.

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

Statement from the Champion, Machinery and Equipment Productivity Nexus

“ Machinery and Equipment Productivity Nexus (MEPN) aims to strengthen its role at the sectoral and enterprise level to hasten productivity growth in the M&E subsector through technology and digital adoption, as aligned with the Government’s goals in Industry4WD ”



Industry players in the manufacturing sector must leverage digitalisation and technology adoption in 2022 to boost productivity growth and revive the economy.

Malaysia's government has set forth assistance and support for the manufacturing sector to accelerate business recovery and expansion, aligning with Industry4WRD. In 2022, RM45 million is allocated for the manufacturing and services sectors to transition toward Industrial Revolution 4.0 through technology adoption and digital transformation. The industry should maximise an opportunity to propel innovation, enhance competitiveness, and boost productivity. M&E is a vital subsector for its cross-cutting linkages with major economic segments. For as much as the government is doing its part in supporting the M&E subsector, likewise, the industry players must play a role in growing the subsector further. Business dynamism is the product of all parties.

MEPN is looking forward to enhancing its initiatives and programmes to facilitate the subsector's growth. The Twelfth Malaysia Plan (12MP) has indicated that the manufacturing sector will focus on producing high value-added and complex products in the next five years, especially in E&E, chemicals and chemical products, M&E, and aerospace. This is a good direction for the M&E subsector and specifically a good guide for MEPN and its future activities. The industry players need to understand the impact when this goal is materialised – high business productivity, profitability, and performance, translated into prosperity for all.

MEPN is affirmative in rallying the industry players and relevant parties to move in this direction alongside Industry4WRD.

Mac Ngan Boon

Champion

Machinery and Equipment Productivity Nexus (MEPN)



PART I

MACHINERY AND EQUIPMENT SUBSECTOR PERFORMANCE



MACHINERY AND EQUIPMENT SUBSECTOR IN MALAYSIA

AN OVERVIEW

The Malaysian government has identified the Machinery and Equipment (M&E) subsector as one of the main focus areas for growth and expansion. The Ministry of International Trade and Industry (MITI) indicated that Malaysia has the potential to be a leading regional producer and exporter of M&E. In terms of investment, the Malaysian Investment Development Authority (MIDA) positioned Malaysia to be the destination of choice within the ASEAN region, with the M&E subsector to be among Malaysia's high-growth and catalytic industries.

Malaysia's M&E subsector is one of the strongest in the ASEAN region, with forecasted growth of 10.1 per cent per annum between 2018 – 2027.¹ The country's conducive business ecosystem for the M&E subsector has propelled internationally renowned and advanced M&E companies such as SKF, VAT, Oerlikon Balzers, Favelle Favco, Vitrox, SRM, and FMC, among others.

Malaysia's massive potential in the M&E subsector was evident in the virtual Export Acceleration Mission (EAM) to Germany, in which 18 local M&E companies generated around RM55 million in potential export sales. The programme organised by the Malaysian External Trade Development Corporation (MATRADE) facilitated the creation of export opportunities for the local M&E companies. The mission further strengthens Malaysia's position as the regional hub for the M&E subsector while enforcing local companies' business internationalisation, expansion, and high value-added activities. The achievement from the mission indicated Malaysia's M&E companies' capability to expand globally, especially in the manufacturing and processing of precision machining parts and the system assembly as well as integration within the M&E segments.²

CONTRIBUTION TO MALAYSIA'S ECONOMY

Malaysia's Gross Domestic Product (GDP) contracted by -5.6 per cent (RM 1,343.9 billion) in 2020 by comparison to 2019, which recorded growth of 4.4 per cent (RM1,424.3 billion)³. The contraction was primarily due to the restriction in economic activities and movements of goods and people as the containment measures in response to the COVID-19 pandemic. Malaysia's GDP bounced back to 3.1 per cent in 2021, signalling that the country is on the right track of economic recovery.

The manufacturing and services sectors remain the most significant contributors to the supply side, which account for 80.6 per cent of Malaysia's GDP. The manufacturing sector recorded a decrease in value added, annual percentage change and

percentage share by -2.6 per cent in 2020 compared to 3.8 per cent in 2019. In percentage share to GDP, the manufacturing sector's contribution was 22.9 per cent in 2020, an increase from 22.2 per cent in 2019.⁴

The M&E subsector recorded a value added of RM10 billion in 2021, which indicated an increase from RM9 billion in 2020 (Figure 1). The M&E's contribution to Malaysia's GDP was consistently at 0.7 per cent from 2017 to 2021.

Figure 2 shows that the M&E subsector contributed 4.0 per cent to total Malaysia's export, valued at RM49.59 billion in 2021. The subsector export shows a tremendous increase of 34.4 per cent in 2021 as compared to 2020.

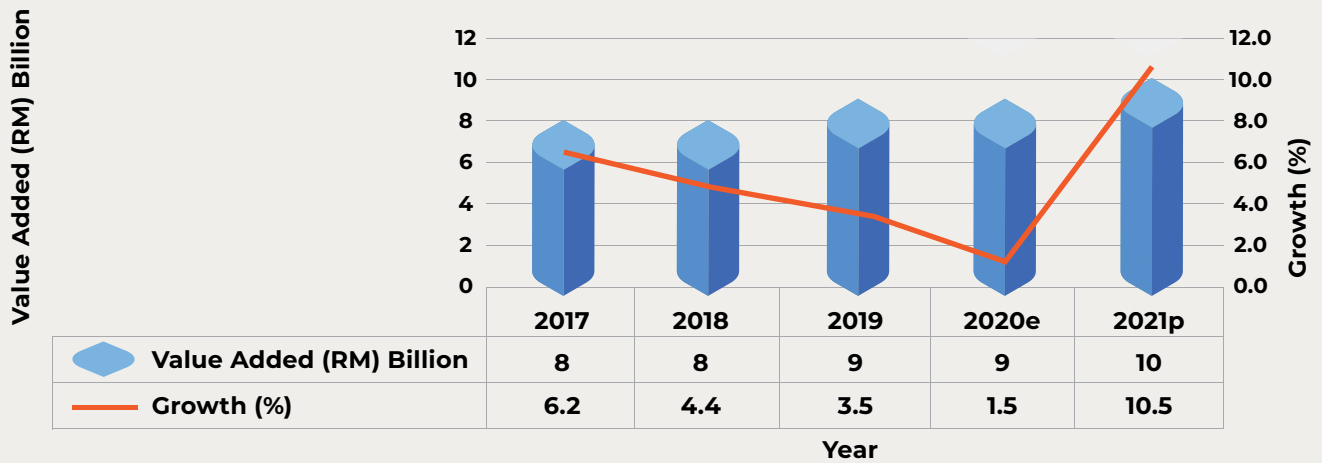
¹ Malaysia: In a league of its own (Malaysian Investment Development Authority – MIDA)

² <https://api.nst.com.my/business/2021/11/742792/18-local-me-companies-generate-about-rm55mil-export-sales-germany-matrade>

³ In constant 2015 prices, reported in Annual Gross Domestic Product 2015 – 2020 (Released 11 May 2021)

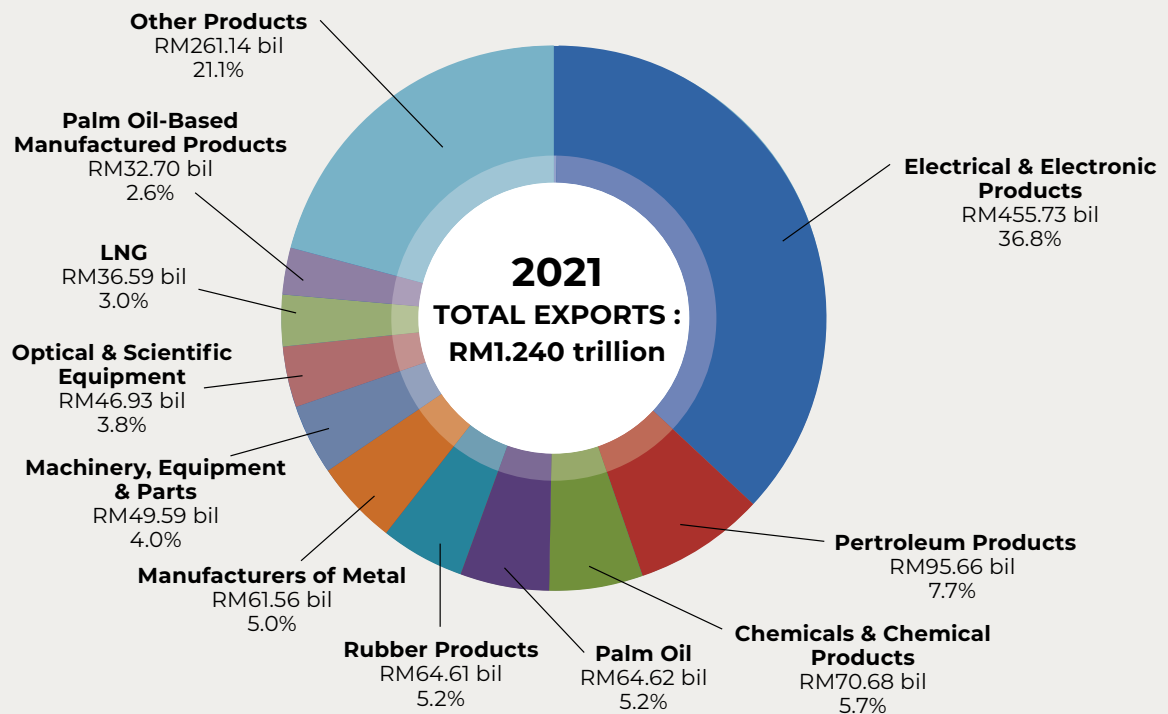
⁴ At constant 2015 prices

Figure 1 : Machinery and Equipment Subsector Value Added 2017 - 2021



Source: Department of Statistics Malaysia (DOSM)

Figure 2 : Malaysia's Exports in 2021



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

Table 1 : Exports Value and Destinations of Exports According to M&E Main Categories (2014 – 2019)

| Sub-Sectors | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | Major Destinations |
|---|--------------------------|---------------------------|--------------------------|--------------------------|--------------------------|---------------------------|--|
| | RM bil (US\$ bil)* | RM bil (US\$ bil)** | RM bil (US\$ bil)* | RM bil (US\$ bil)' | RM bil (US\$ bil)' | RM bil (US\$ bil)'' | |
| Power Generating M&E | 2.3 (0.7) | 2.6 (0.7) | 2.6 (0.6) | 3.4 (0.8) | 3.3 (0.8) | 3.9 (0.9) | Singapore, USA, Japan, Germany, UK |
| M&E for Specific Industries | 10.7 (3.1) | 14.5 (4.1) | 15.2 (3.5) | 16.2 (4.2) | 16.1 (4.1) | 16.2 (3.7) | Singapore, USA, Japan, Indonesia, Thailand |
| Metalworking M&E | 1.7 (0.5) | 1.6 (0.5) | 1.5 (0.3) | 2.0 (0.5) | 1.9 (0.5) | 1.5 (0.3) | Singapore, Hong Kong, Japan, USA |
| General Industrial M&E, Components and Parts | 15.3 (4.4) | 17.6 (5.0) | 18.4 (4.3) | 18.6 (4.8) | 19.2 (4.9) | 19.8 (4.5) | Singapore, Hong Kong, Japan, USA, Australia |
| TOTAL | 30.0 (8.6) | 36.3 (10.4) | 37.7 (8.4) | 40.2 (10.3) | 40.5 (10.3) | 41.4 (9.5) | |

Source: Malaysia External Trade Development Corporation (MATRADE)

Exchange rate as indicated in Figure 4: USD1 = RM3; *USD1 = RM3.5; **USD1 = RM4.3; 'USD1 = RM3.9; ''USD1 = RM4.35

Table 1 illustrates the major categories of M&E exports from 2014 to 2019. Malaysia's M&E subsector has not been able to grow into a manufacturer of complete equipment. Instead, Malaysian industry players in M&E have positioned themselves as either Original Equipment Manufacturers (OEM) or manufacturer of components.⁵ As shown in Table 1, exports from Malaysia's M&E subsector are mainly in M&E for specific industries and general industrial M&E, components and parts. The overall trend in the M&E exports implies the opportunity for expansion. MATRADE reported that more companies are venturing into innovation, system integration,

developing proprietary M&E for international exports, engineering design, and research & development activities. The current efforts are expected to boost the M&E growth.

The continuous inflow of foreign and domestic investments in various industries catalyses the dynamism of the M&E subsector in Malaysia. The primary industries are semiconductor, E&E, automotive, oil and gas, aerospace, medical and food processing. The need for sophisticated M&E is the causal factor to their competitive advantage in the marketplace within these industries.

LABOUR PRODUCTIVITY GROWTH OF THE M&E SUBSECTOR IN MALAYSIA

Table 2 illustrates the labour productivity growth of the M&E subsector in comparison to other main economic subsectors in Malaysia under the agriculture, manufacturing, and services sectors. The subsectors correlate with nine Productivity Nexus established under Malaysia Productivity Blueprint (MPB).

The M&E subsector's productivity level recorded a significant increase from RM86,229 in 2020 to RM93,981 in 2021, with a growth percentage of 9.0 per cent. The subsector's productivity growth in 2021 surpassed its pre-pandemic performance in 2019 (Figure 3).

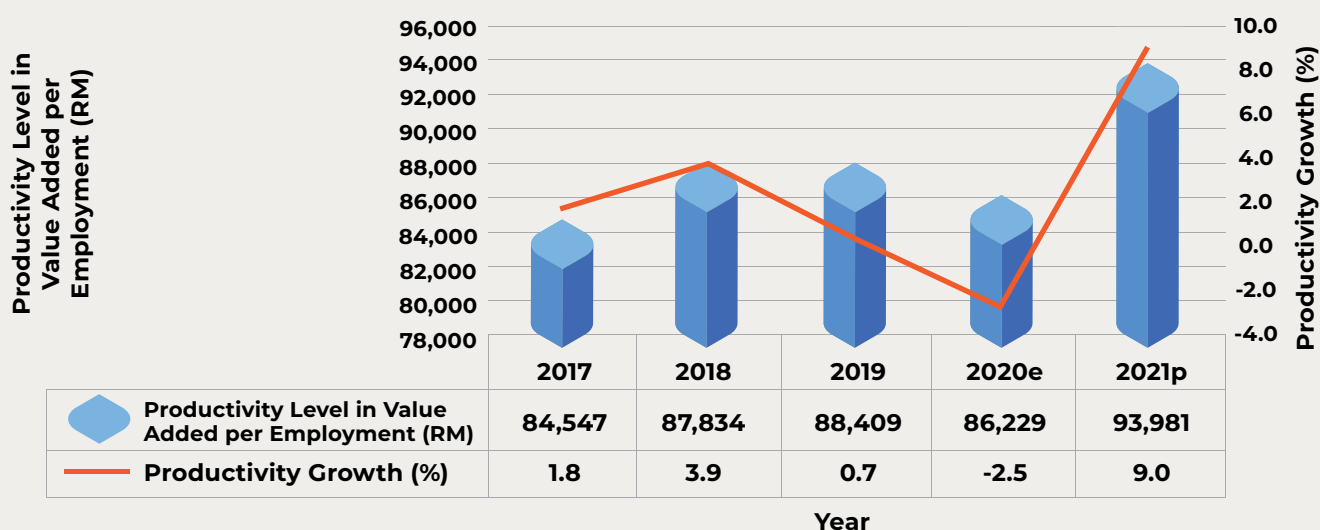
⁵ <https://www.trade.gov/country-commercial-guides/malaysia-equipment-machinery>

Table 2 : 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 & Beverages | 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

**Figure 3 : Labour Productivity Growth of the Mechanical and Equipment Subsector:
Value Added per Employment (%) 2017 - 2021**



Source: Department of Statistics Malaysia (DOSM), In RM'000 per worker at constant 2015 prices

EMPLOYMENT

The M&E subsector is dominated by locally-owned SMEs who mainly produce in small batches (instead of mass production) and provide customised solutions for more prominent manufacturers. A large portion of these SMEs are largely risk-averse and tend to stick to traditional business management methods, which do little to contribute to the productivity of the subsector in today's business environment. The growth of the M&E subsector is reflected by the number of people employed in the industry.

M&E in Malaysia is typically a labour-intensive subsector, where the workforce needs to be equipped with both technical and management skills to truly understand the intricacies of the processes involved. With the increase of automation in the subsector, SMEs will require fewer workers to produce the same output, with better control and fewer defects. Upskilling the local M&E workforce will increase their income, raise the subsector's productivity levels and reduce the nation's dependence on low-skilled labour.

MACHINERY AND EQUIPMENT SUBSECTOR PROFILE

Generally, Malaysia's M&E subsector can be divided into four (4) major categories namely:

- 1 Specialised Machinery and Equipment for Specific Industries;
- 2 General Industrial Machinery and Equipment, Components and Parts;
- 3 Power Generating Machinery and Equipment; and
- 4 Machine Tools and Metalworking Machinery.

Specialised Machinery and Equipment for Specific Industries – This category refers to the manufacturing of M&E and related parts which are specifically designed and customised for use in a specific industry or process, such as in the oil and gas industry, E&E, packaging, solar and photovoltaic, semiconductor, plastic extrusion and injection, and agriculture.

General Industrial Machinery and Equipment, Components and Parts – This category includes the manufacturing of general-purpose M&E and related parts, which comprise a broad category of products such as heating and cooling equipment, material handling equipment, factory automation, tools and apparatus, pumps, compressors, and transmission shafts. This category is the largest industry category

and export contributor to the M&E subsector. Currently, Malaysia hosts over 500 companies comprising local and international players. Malaysia is the major supplier of high-speed heavy lifting tower cranes, oil and gas pedestal cranes, HVAC units, and process automation systems. The country is also one of the biggest exporters of air conditioning equipment. Automated material handling equipment and factory automation are gaining momentum as the manufacturing sector transitions toward IR4.0 and smart manufacturing. Automated material handling equipment is crucial in establishing smart manufacturing for product and process quality and efficiency.

Power Generating Machinery and Equipment – This category involves the manufacturing of M&E and related parts for power generation, which includes steam or other vapour-generating boiler, turbines, engines, and motors. Malaysia is currently the biggest manufacturing hub of boilers in Southeast Asia, catering to the local demands from oil and gas, oleochemicals, petrochemicals, food and beverages, palm oil, rubber, wood, textile, and hospitals. The current state of the power generating M&E denotes domestic producers' capabilities to produce globally acclaimed products and supply industrial boilers. Power generating M&E is expected to be among the robust growing M&E, driven by expanding operations and facilities across industries. There is an opportunity for the domestic players to manufacture reconditioned or refurbished power generating

equipment, for example, generators and industrial turbines.

Machine Tools and Metalworking Machinery – This refers to the manufacturing of machine tools and related parts for working metal or other materials. MATRADE indicated that the metalworking category has many opportunities in the M&E subsector, namely in machining centres, laser cutting machines, electro-discharge machines (EDM), drilling machines, lathes, shearing machines, bending rolls, stamping machines, press brakes, milling machines, presses,

and forging machines. Currently, several industry players in Malaysia and international joint-venture companies are venturing into manufacturing metalworking machinery for various industrial users such as in automotive, E&E, and engineering supporting sectors, indicating a great potential for the industry subsector expand.

M&E MSIC Code – Table 4 lists Malaysia Standard Industrial Classification (MSIC) code for the M&E subsector according to the Department of Statistics Malaysia (DOSM).

Table 4 : M&E MSIC Codes

| No. | Sub-industry | MSIC Code |
|-----|--|-----------|
| 1. | Engines and turbines, except aircraft, vehicle and cycle Engines | 28110 |
| 2. | Fluid power equipment | 28120 |
| 3. | Other pumps, compressors, taps and valves | 28130 |
| 4. | Bearings, gears, gearing and driving elements | 28140 |
| 5. | Ovens, furnaces and furnace burners | 28150 |
| 6. | Lifting and handling equipment | 28160 |
| 7. | Office machinery and equipment (except computers and Peripheral equipment) | 28170 |
| 8. | Power-driven hand tools with self-contained electric or Non-electric motor or pneumatic drives | 28180 |
| 9. | Refrigerating or freezing industrial equipment | 28191 |
| 10. | Air-conditioning machines, including for motor vehicles | 28192 |
| 11. | Other general-purpose machinery n.e.c | 28199 |
| 12. | Agricultural and forestry machinery | 28210 |
| 13. | Metal-forming machinery and machine tools | 28220 |
| 14. | Machinery for metallurgy | 28230 |
| 15. | Machinery for mining, quarrying and construction | 28240 |
| 16. | Machinery for food, beverage and tobacco processing | 28250 |
| 17. | Machinery for textile, apparel and leather production | 28260 |
| 18. | Other special-purpose machinery n.e.c. | 28290 |

PART II

CHALLENGES, INITIATIVES, AND RECOMMENDATIONS



MACHINERY AND EQUIPMENT PRODUCTIVITY NEXUS (MEPN)

Machinery and Equipment Productivity Nexus (MEPN) aims to address the M&E subsector's productivity challenges through the implementation of four initiatives:

- 1 Set up partnerships between government and industry associations to upskill the existing employees;
- 2 Set up a Centre of Excellence for skilled professionals to share industry expertise and develop new technologies;
- 3 Update the domestic product standards to be at par with international standards and enforce compliance; and
- 4 Set up more product testing facilities to ensure quality standards.

MEPN, established under the MPB and overseen by Malaysia Productivity Corporation (MPC), works closely with the Machinery & Engineering Industry

Federation (MEIF) to execute some of MEPN productivity improvement initiatives. MEIF consists of eight associations and one tertiary education establishment. Four workgroups are established to plan, monitor, and execute the projects to ensure the smooth flow of the initiatives planned. Leaders and Subject Matter Experts are appointed in each workgroup to advise, recommend and support MEPN Champion based on their expertise in project implementation to expedite the implementation of the MEPN projects. The workgroups are:

- 1 **Workgroup 1** : Talent and Manpower
- 2 **Workgroup 2** : Productivity & Innovation
- 3 **Workgroup 3** : SME Empowerment & Development
- 4 **Workgroup 4** : Ecosystem – Policies and Procedures

CHALLENGES WITHIN THE MACHINERY AND EQUIPMENT SUBSECTOR

M&E is one of the crucial subsectors that propel Malaysia's economic growth. The subsector spearheads the productivity growth in Malaysia's critical economic activities such as agriculture, mining and quarrying, manufacturing, construction, and services.

In general, the main challenges faced by the industry players in the M&E subsector are the fear to change and being comfortable with the existing way of doing business. The change here refers to the new way of doing business through digitalisation. The typical incumbent firms perceive digital transformation as optional and therefore tend to delay and wait for the moment where the usage becomes inevitable. This mentality may retard the progress in the industry. In addition, digital transformation requires a high cost. To develop a win-win situation strategy, digital transformation needs to

be done gradually with a proper plan and resource distribution during the transition period.

In terms of talent and manpower, the M&E industry players are facing challenges in hiring competent talent for employment. From the fresh graduate to the senior technical staff, the elements of Industrial Revolution 4.0 constantly challenge the business operation. As an industry that deals with advanced technology, human capital development needs to be proactive and provide continuous training so that employees can cope with the latest technology and the new way to perform tasks. The TVET institutions and institutions of higher learning need to be empowered with the most current knowledge in science and technology and their application to the industry. The adequate supply of talent from the higher learning institutions will lessen the burden of the industry to upskill or reskill employees.

The other tangible challenge faced by the M&E subsector is expensive resources such as product testing centres or research and development (R&D) centres for product development. Some of the R&D equipment and testing facilities in government research institutes are under-utilised. To become the "gamechanger" or produce the

cutting-edge technology, the R&D ecosystem must be conducive for the industry players. The ideal solution is resource sharing and optimisation through collaboration or a win-win partnership between various parties. Through partnerships, facilities or equipment can be leveraged to produce innovative R&D products.

MEPN'S PAST INITIATIVES TO ACCELERATE PRODUCTIVITY GROWTH, 2017-2021

From 2017 to 2021, MEPN, in collaboration with MEIF, implemented four initiatives to drive the productivity and competitiveness for the M&E subsector. Within each initiative, there were several productivity improvement projects.

INITIATIVE 1 : SET UP A PARTNERSHIP BETWEEN THE GOVERNMENT AND INDUSTRY ASSOCIATIONS TO UPSKILL THE EXISTING EMPLOYEES.

Develop a framework for upskilling the existing M&E employees

Human capital development is the backbone of national economic growth and prosperity. Skillful, knowledgeable and innovative human capital empowers economic activities across all sectors, especially in a highly technical industry such as the M&E subsector. According to Thrust 5 and 6 in the Third Industrial Master Plan 2006-2020 (IMP3), the development of highly skilled workforce and institutional support are crucial in achieving the national targets in the Eleventh Malaysia Plan. MEPN developed a Public-Private Collaboration Framework to upskill the existing employees, as in Figure 4. The initiative used the quadruple helix ecosystem and involved six strategic partners.

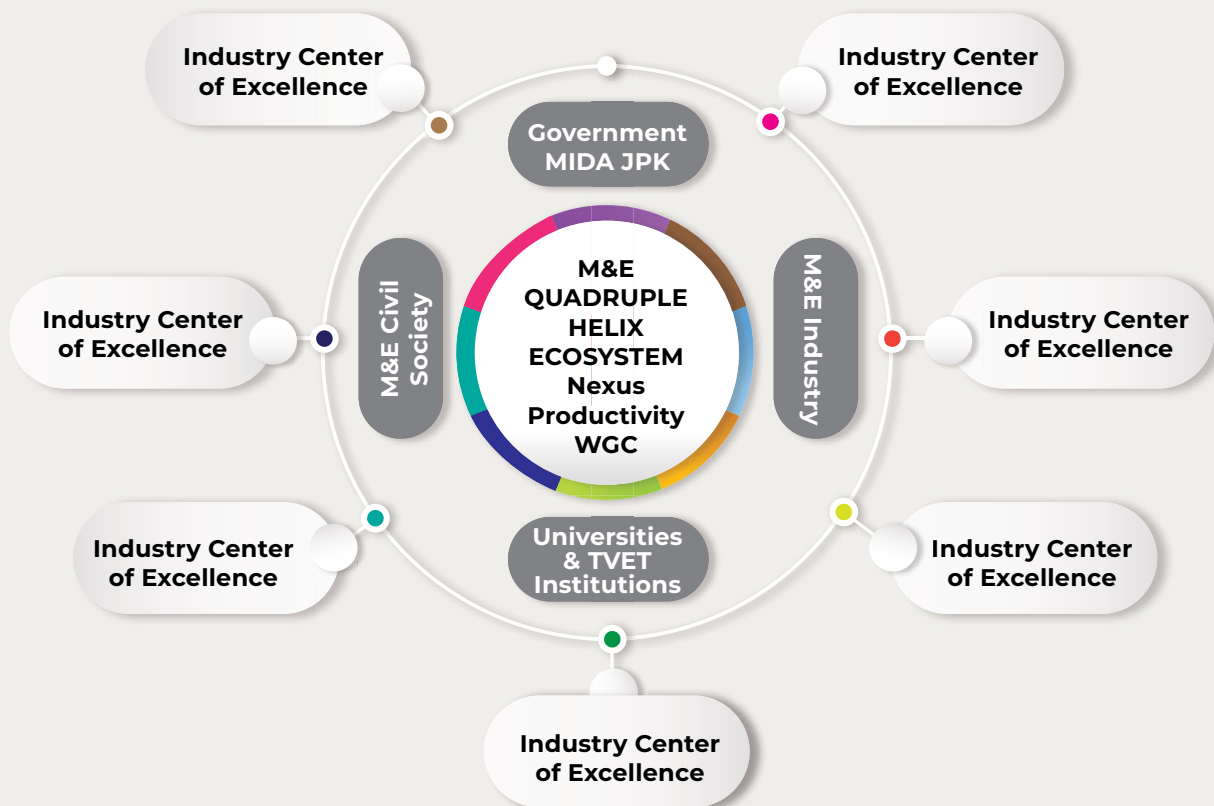
The conceptual framework was based on the institutional sphere for innovation that captures multiple reciprocal relationships among the public and private sectors, and academia at different stages in capitalising on knowledge. Government arms such as MIDA and JPK are the enablers who regulate and facilitate the ecosystem. They become the support system and platform for the M&E subsector, civil society and higher learning institutions to enhance their resources through collaborations. The mutual

benefit could be in the form of a Memorandum of Understanding (MoU), Industry PhD, Adjunct Professor, Industrial examiner, Internship, Industry Center of Excellence (ICoE), R&D Labs, certification programmes, job placements, work-based learning, Skim Latihan Dual National (SLDN) Advisory Board-PSDC and Industrial Lecturers.

In ensuring a mutually enriching partnership, The Public – MPC-MEIF-TVET institution MoUs were initiated comprising five important measures;

- 1 Match competent M&E talents,
- 2 Realign the academic and industry requirements,
- 3 Establish core or niche areas for the universities, TVET institutions, industry and civil society,
- 4 Identify the gaps with regards to universities, TVET institutions and industry, and
- 5 Review the current university-industry-government-civil society programmes.

This project successfully sealed five MoUs between MPC – MEIF and SHRD, NSSDC, KISMET, GMI and ILP Pedas and one Letter of Intent (LOI) were signed with UTeM. The official collaboration paved the way to explore more possibilities of negotiating, planning and preparing future activities related to talent enhancement programmes, besides encouraging knowledge and technology transfer between members in the ecosystem. The engineering-related modules could be developed with more extensive input from all the related parties.

Figure 4 : The Conceptual framework implemented solutions by the Ministry of Higher Education

The Industrial Skill Framework (IndSF)

MEPN, in collaboration with Human Resource Development Fund (HRDF), digitally published "The industrial Skills Framework for the Machinery and Equipment Subsector" to empower talent development in the subsector, as shown in Figure 5. The framework identified the job scope in the M&E occupational areas and addressed the required skills and competencies in the M&E subsector. It is a reference for the industry and educational institutions to analyse human resource competency requirements and a career guide for the public.

The challenges faced by the industry in employment pointed out the need for relevant competencies and technical skills in the talent pool. In addition, some positions require particular technical knowledge, which is not taught in universities or TVET institutions. The graduates, in general, need to possess problem-solving skills, the ability to work independently, and critical thinking and collaboration skills. On top of

Figure 5 : The Industrial Skills Framework (IndSF) produced by MEPN in collaboration with HRDF and MEIF

that, specialised knowledge is also required to cope with the highly technical tasks in the engineering field.

The framework deliberated the occupational structure (OS), job profiling, job competencies, and skills categories for the subsector extensively. The OS described the job on a specific area of expertise, occupational title, potential job titles, and the occupational pathway related to the subsector. The development of the OS was based on the standard competency level for each job area which reflects Levels 1 to level 6 covering the domains of knowledge, skills and competencies. Based on the competency levels, six Occupational Structures (OS) were developed, covering M&E Design, fabrication (machining and special tooling), fabrication (protective coating), assembly testing and repair, quality management, and the industrial automation engineering involving robotic engineering and automation system engineering. In terms of job profiling and skills categories, the framework categorised the job area according to the job position for the category areas, skills category, required skills and the required engineering fundamentals.

As part of the implementation plan, the Industrial Skills Framework (IndSF) for the M&E Subsector was published online and available on MPC and HRDF websites. The document was launched during the MetalTech & Automex Hybrid Exhibition 2020.

Customized Training Programme

There were three training programmes conducted :

- 1 Visualisation of Overall Equipment Effectiveness (OEE) Programme,
- 2 Digitalisation Transformation - VTrox V-One training; and
- 3 Industry Lean Apprentice.

Visualisation of Overall Equipment Effectiveness (OEE) Programme

The programme consisted of six days of customised training to upskill the existing employees based

on the industry's needs and enhance skills and competencies in the OEE application. The programme recorded the participation of 11 participants from 8 companies. The programme was expanded to another avenue to increase participation. It was adopted in the PRODUCTIVITY1010 intervention programme to leverage the funds from PENJANA and LAKSANA stimulus packages.

Digitalisation Transformation – Big Data Analytics Training

The Big Data Analytics Training was a complete digital intelligent system package in automation that provides real-time monitoring analysis output. The objective of the training was to increase awareness of the importance of big data and data analytics and understand the roles and usage of big data and data analytics in organisational and operational management. 21 participants were trained, with a 6-month free trial on V-One System. The awareness of this programme was enhanced through Webinar series to capture more participants to be trained with Vi-Trox V-One.

Industry Lean Apprentice Training Course

In producing continuous improvement in technical education, a standard productivity training course, namely The Industry Lean Apprentice, was developed and implemented by MEPN in collaboration with MEIF and TVET strategic partners. It was a training programme driven by the idea of integrating the expectation of industry participants, knowledge of TVET experts, and government agencies' initiatives. The aim was to cater to graduates' needs to acquire specific competencies applied in the industry compared to the exam-oriented module offered in higher learning institutions. The training course was endorsed on 24 September 2020 (Figure 6).

The development of the OS was based on the standard competency level for each job area which reflects Levels 1 to level 6 covering the domains of knowledge, skills and competencies

Figure 6 : The endorsement of The Industry Lean Training Course

The training provided eight modules in empowering graduates and matching their competencies with the M&E related industries :

- 1 Introduction to the APO (Asia Productivity Organization), MPC, MEPN and MEIF;
- 2 Importance of productivity;
- 3 Financial analysis;
- 4 Lean manufacturing: Zero waste;
- 5 Standards and clarity;
- 6 Value Stream and Kaizen; and
- 7 Quick changeover and Poka-Yoke.

The development of this standard productivity training course was the beginning of more courses with many hands-on activities and simulations. It suited the demanding industrial competencies to provide students with a relevant learning

environment. The training scheme could be the best avenue to combine all the expectations from the industry and delivery methods from higher learning institutions' lecturers or trainers with guidance from the relevant government agencies.

INITIATIVE 2 : SET UP A CENTRE OF EXCELLENCE FOR SKILLED PROFESSIONALS TO SHARE INDUSTRY EXPERTISE AND DEVELOP NEW TECHNOLOGIES

CoE to Enhance Competitiveness and Standard Compliance

In increasing the capacity and capability in science and technology, establishing the Centre of Excellence (CoE) is very important to create a friendly ecosystem for the M&E business enterprises. It assists the industry in developing or adopting new technology and sharing best practices. The CoE Framework was developed to support more establishments of CoEs in the industry. It complemented the MMIC's (Malaysian Machinery Innovation Center) initiative by MIDA. Nine webinars were conducted, with 1000 participants attending the sessions.

Business Excellence and Productivity Enhancement Programme

In the aspiration to help the SMEs to enhance operations related to productivity improvement and encourage new product development in the local M&E enterprises, the business excellence and productivity enhancement programme using productivity assessment tools, namely Productivity Gain Measurement (eGPM) and Business Excellent Framework, were successfully conducted by MEPN in 2020. The programme aimed to train 10 IPS in productivity enhancement tools and assist 20 companies in assessing their productivity performance.

10 IPS were trained, and five companies underwent deep dive consultation, which produced five productivity performance reports (Numac Machinery Sdn Bhd, Muhibbah Airline Services Sdn Bhd, Muhibbah Steel Industries Sdn Bhd, HH Precision Mould Sdn Bhd and Coraza Systems Malaysia Sdn Bhd.). The report evaluated five years (2013 – 2018) of business measurement on the companies' profitability, growth, productivity, and efficiency.

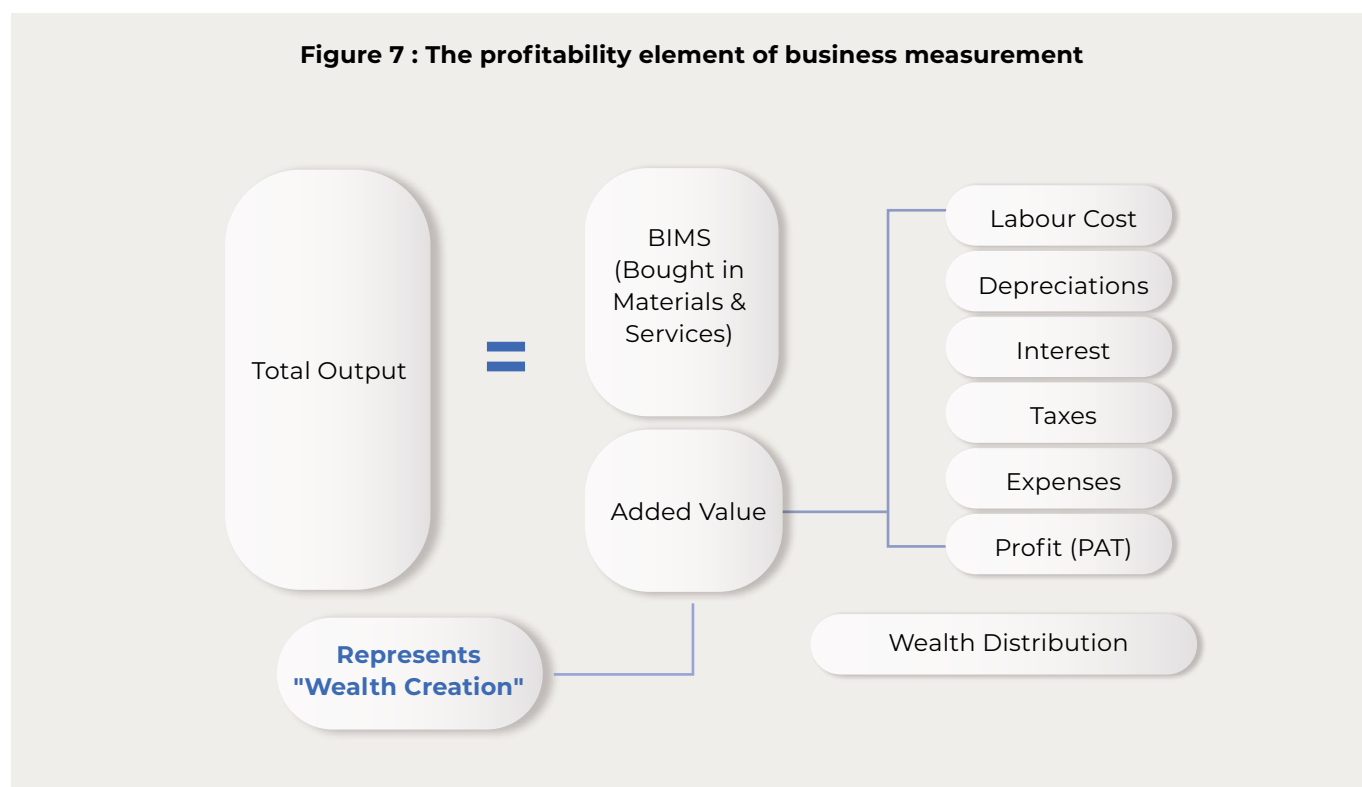
The profitability measured each company's ability to add value, and sustainably create wealth and profits, as indicated in Figure 7. The analysis probed the performance and helped the company identify the downside that required improvement.

A company creates wealth and profits by "adding value" to its product or services. The wealth creation capacity of a business enterprise depends on the "added value created in the business."

Profitability was examined by looking at a company's data on the performance of the percentage of added value, operating profit ratio, percentage of operating profit, and observation of the growth of year-on-year sales and profit.

In terms of productivity, the report measured labour productivity, labour cost competitiveness, capital intensity, capital productivity, process efficiency, and overall profitability by considering the operating profit per total output.

Figure 7 : The profitability element of business measurement



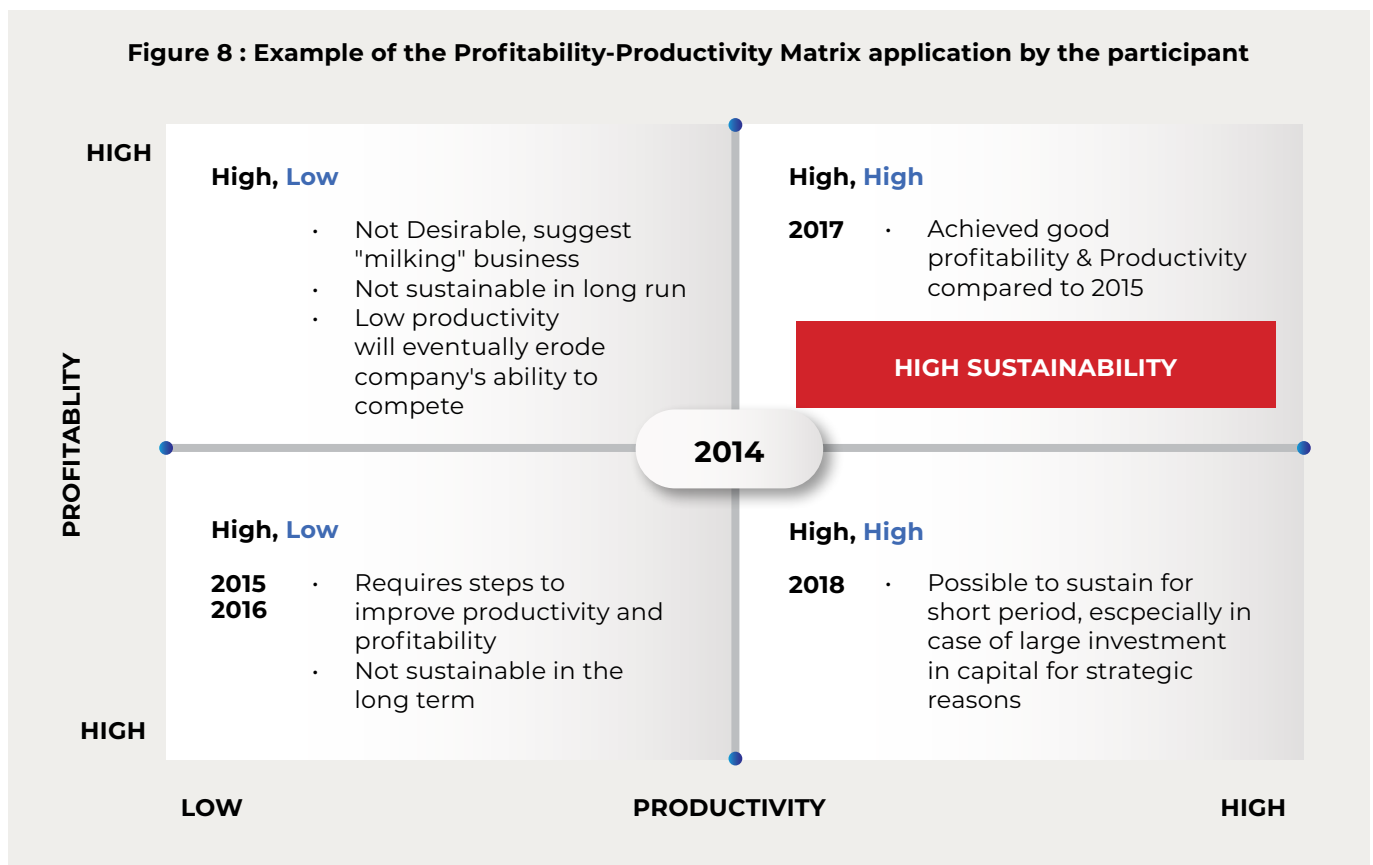
The final assessment mapped the yearly performance to the Productivity-Profitability Matrix, as indicated in Figure 8, to observe the overall achievement of the company performance, identify strengths and weaknesses then subsequently plan for a better strategy to improve the company's business. The desirable state from the Profitability-Productivity matrix should be in the quadrant where both elements achieve high performance. However, the other three quadrants can point out improvement measures required to achieve high sustainability.

M&E Virtual Advisory Clinic (MEVAC)

The Machinery and Equipment (M&E) Virtual Advisory Clinic (MEVAC) was a digital platform for enterprises to get online consultation from the M&E industry experts. The objectives of the programme were:

- 1 To serve as a channel for Malaysian enterprises to raise matters of mutual interests, especially in the M&E subsector;
- 2 To be the platform for dialogue with advisors from the M&E subsector during the COVID-19 MCO (Movement Control Order) period;
- 3 To disseminate information on selected assistance available to industry or SMEs; and
- 4 To update on various programmes available to enhance overall industry productivity and competitiveness, essential for business sustainability.

Figure 8 : Example of the Profitability-Productivity Matrix application by the participant

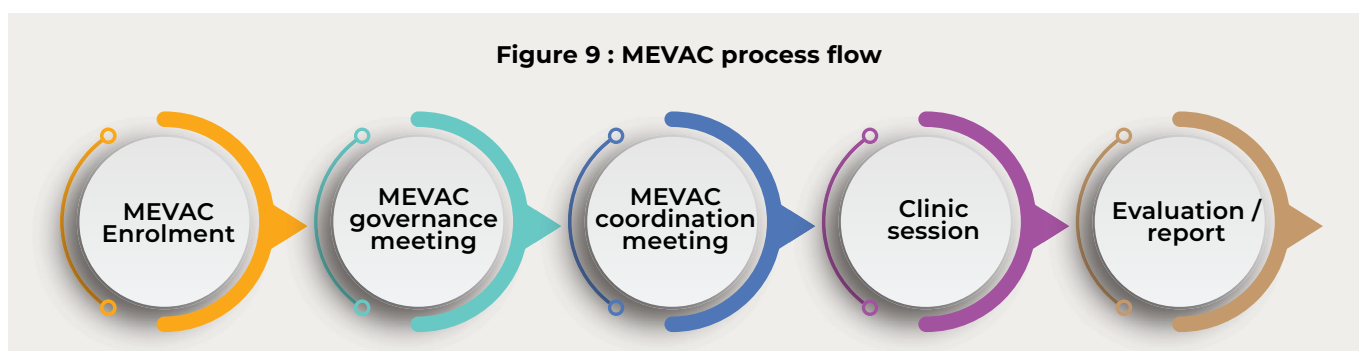


The MEVAC focused on three aspects of consultation:

- 1) Financial consultation - Advisory on challenges and issues faced by the M&E industry

players concerning finance and capital, including getting assistance from banks, government ministries and agencies during this COVID-19 outbreak to sustain and continue to run the company at the lowest cost.

Figure 9 : MEVAC process flow



2) Innovative business operation - Advisory on vital elements in innovation business operations and redesigning of business model to fit in the current situation and towards flexible downside or expansion; such as value proposition, business activities toward wealth sharing model, agile human resource and staffing, new business partnership and collaboration, quality control, and standard compliance.

3) Intelligent manufacturing solutions - Advisory on the significant aspects of intelligent M&E manufacturing setup and SMEs may strengthen the M&E subsector in Malaysia. Areas covered may include retrofit/retooling, adaption of digitalisation, semi or full automation, industry 4.0 data analytics and supply chain in the M&E ecosystem.

The programme comprised five stages, as in Figure 9. The MEPN-MEIF collaboration initiated the enrolment to attract participation from the M&E companies. The applications received were discussed in the MEVAC

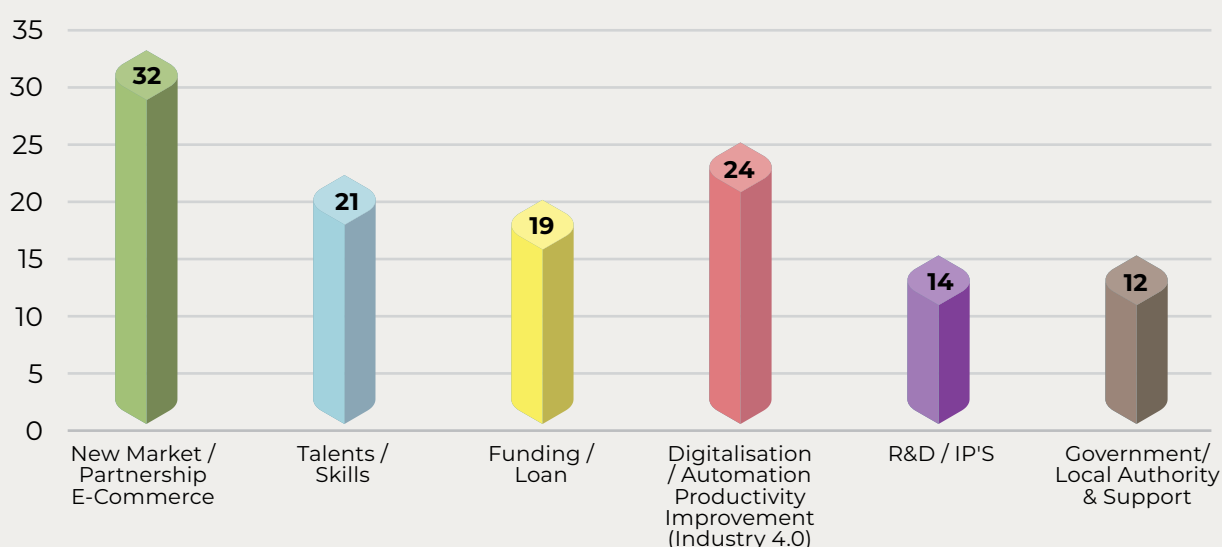
Governance Meeting in stage 2. The council, chaired by the MPC senior management and MEIF industry leaders, confirmed the companies' participation based on the recommendation from the MEVAC technical team expert.

Stage 3 involved MEVAC coordination meeting, where the MEVAC technical expert presented the decision from the MEVAC Governance Meeting for further cross-checking by the members in the coordination meeting chaired by the MEPN programme director and a MEIF industry leader.

The clinics were conducted in the form of online recorded webinar sessions. The MEVAC programme recorded the participation from 54 companies, in which 52 per cent were from manufacturing-based organisations. The MEVAC sessions captured 123 issues faced by the businesses during the MCO period. Most of the issues were related to new markets and digitalisation (Figure 10).

Figure 10 : The summary of the issues raised during MEVAC clinic sessions

Total of : 123 issues from Financial, Business & Manufacturing (42 session)



The programme summed up three main recommendations as a way forward to empower business enterprises in the M&E subsector. The first point highlighted was the Chameleonisation transformation. This term emphasised the importance of SMEs quickly adapting to the changes in business environment for survival, especially during the pandemic. The primary step in the transformation is called BIZEX 3600. Inspired by the vision of chameleon with 3600 coverage, this measure suggested the idea of 3600 vision for Malaysian SMEs in terms of readiness in talent. MPC has developed many online assessment tools like Business Excellence 3600 (BizEx 3600), online Productivity assessment tools, LEAN management and Total Quality Management to groom Malaysia's SMEs.

With the inspiration from a chameleon catching the prey, the second step suggested SMEs to focus on their businesses and fast attack the market or new opportunities. MPC and MATRADE, both under the Ministry of International Trade and Industry (MITI), could collaborate for the fresh market/partnership task force. MATRADE had already established a global market intelligence platform.

The last step in the chameleon transformation was the digitalisation productivity improvement. The entire manufacturing plant could only operate at 30 to 50 per cent of the resources during the MCO. Many SMEs faced problems in delivering the critical products for manufacturing. With digitalisation, the manufacturing capacity was maximised during the MCO 3, where the manufacturers in Penang pushed production up to 70 to 75 per cent of the total output even running with 50 per cent of resources. Like a chameleon that reaches maturity at 1 or 2 years of age with a short life span, the Malaysian SMEs would also face a short business life span if they failed to adapt to digitalisation.

The second recommendation from the MEVAC was to conduct financial dialogues or webinars to cater for the 19 issues related to the financial funding, grants and loans. The government announced a few stimulus packages during the MCO period, but the access to the funds required improvement. The proposed financial seminars involved the relevant stakeholders such as Bank Negara, SME Bank and MIDF.

The last suggestion from the programme was the continuation of the MEVAC programme through MEPN work groups. The implementation could be enhanced by more intense follow-up with the participants based on the advisory reports.

Business Virtual Coordination Programme

The business virtual coordination programme involved two activities; 1) The business financial dialogue and 2) MATRADE trade facilitation session. The business financial dialogue was a web-based seminar organised by MEPN with SME Bank, Export-Import Bank of Malaysia and Credit Guarantee Corporation (CGC), conducted on 9 June 2020. Based on MIVEC 1.0, MEPN invited 42 companies to the clinic sessions and identified that the financial problem was one of the significant issues faced by the M&E companies.

The dialogue provided reliable information for entrepreneurs to realise the support system in financing. Besides the dialogue, MEPN conducted the M&E Virtual Trade Clinics involving MATRADE, which facilitated networking for export, promotion and assistance to navigate the market, identified critical success factors and provided access to grants and financial assistance. The second phase of the virtual clinic was conducted to follow up on the progress of the exporters. From the session, the new exporter highlighted issues related to market expansion, machine installation at sites and work permits, whereby the advanced exporters highlighted additional issues on sales drop, factory automation and manpower. As a continuation of the activities, the ERAT (Export Readiness Assessment Tool) was used to measure company readiness for export. MATRADE continued to guide the new exporters to identify new markets that suit their capabilities, especially in emerging markets in Latin Americas, South Asia, ASEAN and Oceania countries. MATRADE also assisted in providing good contacts to facilitate the companies to be a part of the global supply chains of the M&E subsector, particularly in Engineering Supporting Services in E7E, Aerospace, Automotive and other manufacturing activities.

PRODUCTIVITY1010

Realising the importance of digitalisation to improve productivity, the MEPN, with the support from the Malaysia Automation Technology Association (MATA) and Malaysia Industry 4.0 System Integrator Association (Misi4.0), developed digitisation modules to help manufacturing companies strategise their digitisation plans and kick-start their digitisation journey.

The programme, known as PRODUCTIVITY1010, targeted to assist 1000 manufacturing companies, with the ultimate output being an Individual Digitisation Blueprint, with the help of 20 qualified industry experts as mentors. This module encompassed a digitisation self-diagnostic tool and a Virtual Mentoring Session.

Productivity1010 is a structured programme to enhance and accelerate digital transformation for Malaysian business enterprises, as in Figure 11. The programme's objectives are to apply Digitization Self-Diagnostic Tool for self-check readiness and establish the individual company digitisation roadmap through Prioritization Matrix Tool. The outcome of this programme can be in terms of empowerment of the company's direction in digitalisation. The programme enables enterprises to self-diagnose their digitisation

readiness, prioritise the area of digitisation, and improve the efficiency and productivity of the company. The future programme will include the intervention programme for the proof of concept project.

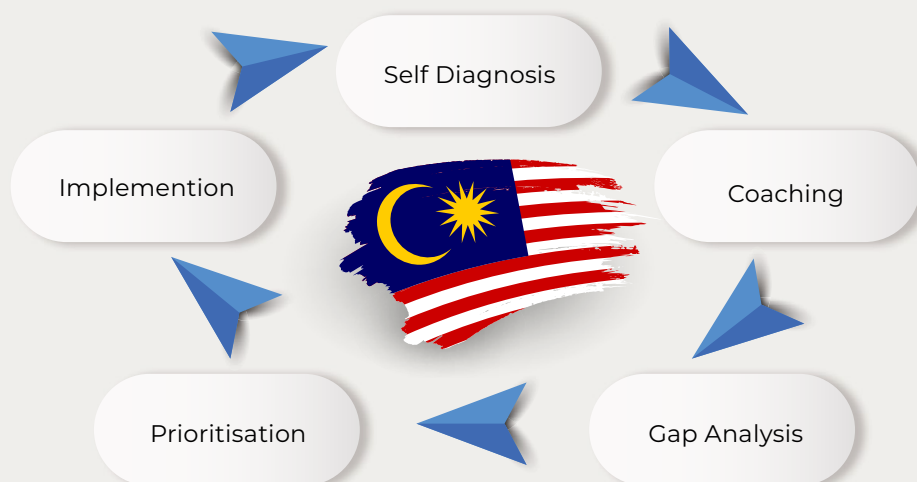
Productivity Assessment and Dialogue

Productivity Assessment & Dialogue diagnosed companies' productivity performance based on the annual P&L reports and recommended implementable solutions in addressing the challenges and barriers of the company. In 2021, 7 companies participated, and four completed the dialogue sessions and produced four productivity reports.

Smart Machinery Programme

Smart Machinery Programme aimed to transform machines and equipment into smart machinery by leveraging industry 4.0 technology, add value, and improve companies' competitiveness in the local and global market. In 2021, 26 participants from 15 companies attended the smart machinery virtual training, with 15 companies underwent proof-of-concept projects using the IIoT Starter Kit provided, and Smart Machinery Module & Guidelines was produced

Figure 11 : The digitization step in PRODUKTIVITI1010



INITIATIVE 3 : SET UP MORE PRODUCT TESTING TO ENSURE STANDARDS ARE MET

Develop a Baseline for Product Testing

A study on product testing in the M&E subsector was conducted. A product testing facility is one of the crucial parts of the Research and Development ecosystem and for business purposes. The recent findings in the study on the product testing in the M&E subsector identified 19 companies which provide test laboratories for iron and steel. MEPN concurrently created awareness amongst its networks of Malaysia's existing product testing facilities.

For imported steel products, alternative testing facilities in ABM, CIDB, CREAM, FRIM, SIRIM and TUV SUD have clarified regarding services offered, testing field, location facilities, and contact persons. This information guides businesses or researchers to find available testing facilities in Malaysia. The input can be used as the reference for establishing the Centre of Excellence for M&E.

Development of the Repository for M&E Supply Chain

To propel the industry towards digitalisation, the database is one of the critical resources for business operation. Gearing up towards this, MEPN conducted the online M&E supply chain repository. The objective was to compile a repository of companies in the M&E and ESS industries which exhibit the capabilities to grow into the international market. The online database collection managed to gather a list of 78 potential companies. This data helped cluster enterprises according to the M&E value chain for long-term competitiveness. More data are required to develop the M&E cluster database to strengthen its capacity and capabilities.

The other effort for the information depository involved the publication of two comprehensive directory documents; 1) System Integrator Directory and value chain mapping and 2) The Automation Technology Providers Directory and Value Chain Mapping for the reference of the M&E industry players as well as the potential customers across other sectors (as in Figure 12). The System Integrator Directory listed 19 companies and detailed their capabilities and services. It also mapped the companies with the system integrator matrix components related to design, hardware equipment, software integration and core expertise.

Figure 12 : The industry directory for a) automation industry and b) System Integrators



In addition, the Automation Value Chain Directory clarified nine categories covering all the products and services within the automation ecosystem;

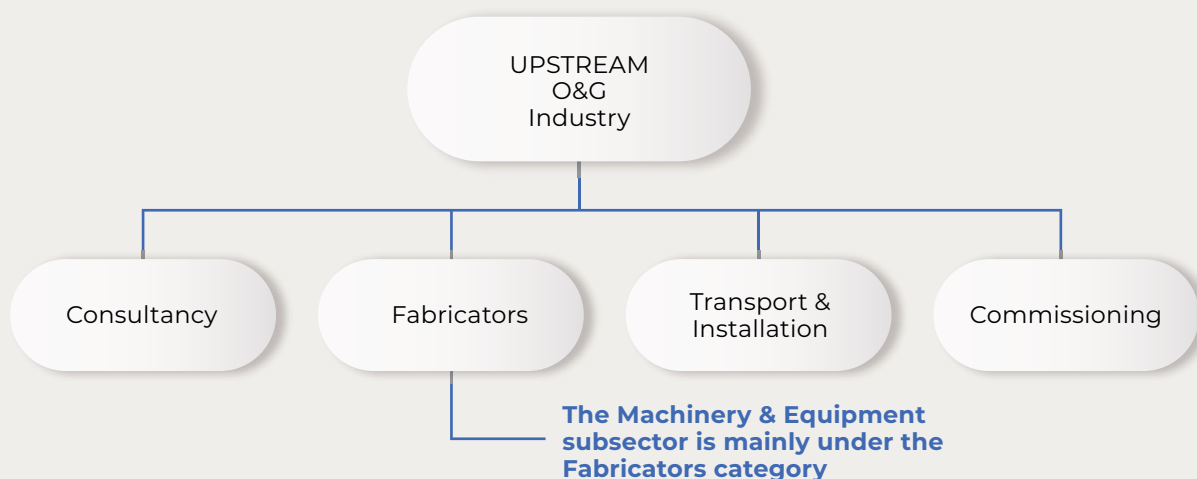
- 1 Automation components/ part manufacturers;
- 2 Sub assembly manufacturer;
- 3 Software developer/vendors;
- 4 System Integrators;
- 5 System/ machine builders;
- 6 Panel Builder/installers;
- 7 Commissioning/maintenance service providers;
- 8 training providers; and
- 9 Distributors/resellers of automation components.

The directory listed 32 companies with a complete description of the companies' services and products. The companies also mapped with the competency map under design, hardware/software integration, IT integration and core expertise. For the way forward, the listed companies will be selected to participate in the M&E industry cluster.

Development of M&E Cluster Framework

In formulating targeted intervention to improve competitiveness, the M&E cluster framework was studied, and the relevant cluster framework was proposed. This development work involved looking at a specialised M&E process for the oil and gas industry and the Malaysian M&E industry cluster proposal. For the Oil and Gas sector, the study focused on the upstream value chain the M&E subsector under the upstream O&G industry, as in Figure 13. Further analysis was conducted to clarify the critical factors in improving all the elements in the value chain of the respective category.

Figure 13 : The three main subsectors under the upstream O&G industry



The key takeaway from the study was the new proposal of eight initiatives to improve productivity which was also mapped with the MPB strategic thrust and MEPN initiatives for 2020. The initiatives were:

- 1 A good supply of technicians and skilled workers;
- 2 A good supply of engineers and project managers;
- 3 Thriving R&D cluster;
- 4 Create a comprehensive IT network across the industry to facilitate design, procurement, manufacture and market access;
- 5 Dynamic technology clusters in software development, material technology, and good manufacturing practices will enable the industry to satisfy international standards;
- 6 Good access to material supply;
- 7 Good logistics and transportation services; and
- 8 Local market access and international promotion.

All the proposed initiatives require owners, group members, and specific KPIs for smooth implementations.

The second study explored the possible clustering model for the M&E subsector by viewing the existing theoretical and applied models. The study highlighted three main industry cluster creation objectives: competitiveness, cooperation, and concentration. These three element resulted in innovation, productivity and enterprise creation. The process flow of industrial cluster creation was proposed in Figure 14.

The success of the cluster formation is expected to be observed in terms of its attainments in productivity, export, innovation and employment. The tangible result is in the R&D expenditure and product and process innovation. In employment, the cluster is expected to produce a number of employees by the type of education and wages. The productivity related result can be in revenue increment, materials, capital stocks and labour productivity. In export, the expected results are revenue, the number of products and the number of countries penetrated.

Figure 14 : The proposed industrial cluster formation flow chart



INITIATIVE 4 : UPDATE OF DOMESTIC PRODUCT STANDARDS TO BE AT PAR WITH INTERNATIONAL STANDARDS AND ENFORCE COMPLIANCE

Review and Update Domestic Product Standard and Enforce Compliance

In improving product standards in Malaysia, a baseline study is crucial to map the current state, identify gaps and work on closing them to meet the desired level of product standard. A review of domestic product standards and compliance was conducted to approach this problem segment. The regulatory governance and standardisation of the M&E subsector were assessed and mapped according to the Diamond framework analysis as in Figure 15. The framework outlined the input and output of the M&E production and the professionals as the regulated custodian of good product design.

The review listed all the related Acts, subsidiary legislation and guidelines under the respective authorities. In summary, according to the Department of Standards Malaysia, 16 regulators impose 539 industry standards in their regulatory regime, where 33 of the industry standards are multiple-used by different regulators. The study also highlighted the importance of registered competent persons

such as professional engineers and other types of qualified persons registered under separate categories. The way forward proposed by the study was to produce more Malaysian Standards, which are internationally recognised to be equivalent to the International Standards.

Development of National Smart Manufacturing Guidelines

The National Smart Manufacturing Standard Guidelines was developed to guide the smart manufacturing standardisation to implement Malaysia Industry 4Wrd strategy in other related work. The smart manufacturing system framework can be constructed based on three dimensions: lifecycle, system hierarchy, and intelligent functions, as in Figure 16. The lifecycle refers to the chain integration consisting of a series of mutually connected value creation activities such as design, production, logistics, sales and services. On the other hand, the system hierarchy comprises equipment, control, workshop, enterprise, and cooperation levels from the lower to the upper. It represents the intelligence and internet protocol of equipment and network flattening. The third dimension of intelligence functions includes the five layers such as resources elements, system integration, interconnection, information fusion and new business pattern.

Figure 15 : Diamond Framework of analysis for M&E regulatory and standardisation review

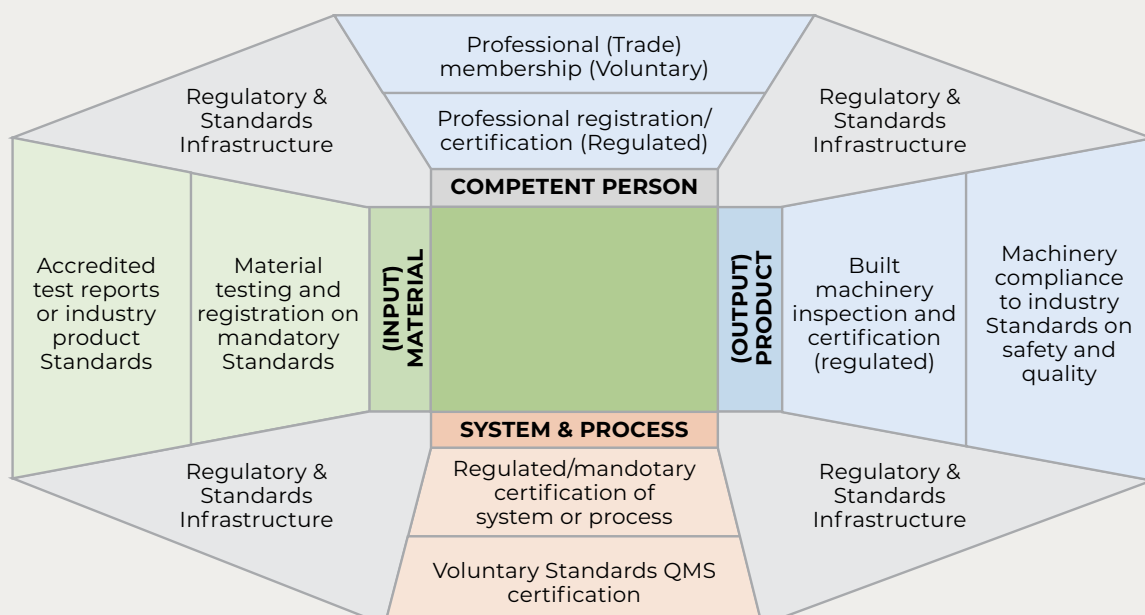
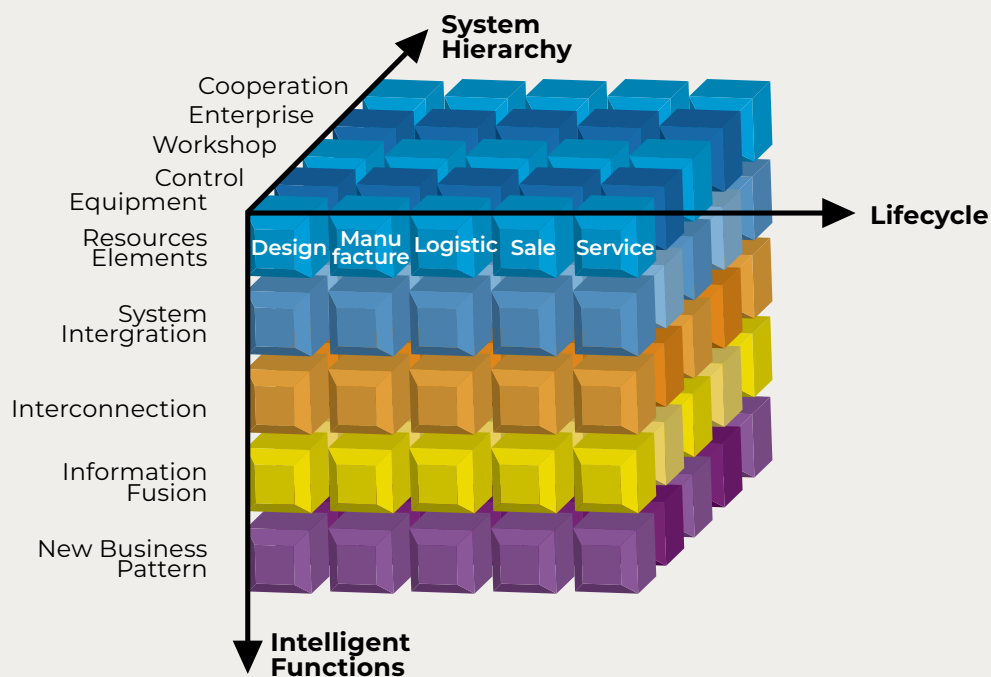


Figure 16 : Smart Manufacturing System Framework

The intelligence manufacturing system framework consists of the essential elements of PLC, industrial robots and industrial internet as a part of the critical intelligence manufacturing field in the system architecture. In detailing the framework, the structural diagram of the smart manufacturing standard system was developed, as in Figure 15. The basic generality standards (A) and key technique standards (B) are defined and implemented to guide the smart manufacturing of all industries. The key industries standards (C) are at the top of the structural diagram of the intelligent manufacturing standard system to handle the specific industrial demands. The details of parts A, B and C standards of the structural diagram were elaborated as a guideline to implement the Smart Manufacturing Standards System (Figure 17).

Streamlining Regulation and Procedure to Reduce the Costs of Doing Business

The project studied the issue's relevance and highlighted it to the stakeholders or higher authorities for recommendations and solutions. Four issues were examined, and three issues were put forward for further actions.

The first issue was the tedious inspection process on imported new machinery (mobile cranes) by PUSPAKOM. The issues was validated and later brought into discussion with the relevant regulator. Based on the discussion conducted, the inspection of new mobile cranes by PUSPAKOM was reduced from twice to once per year for five consecutive years.

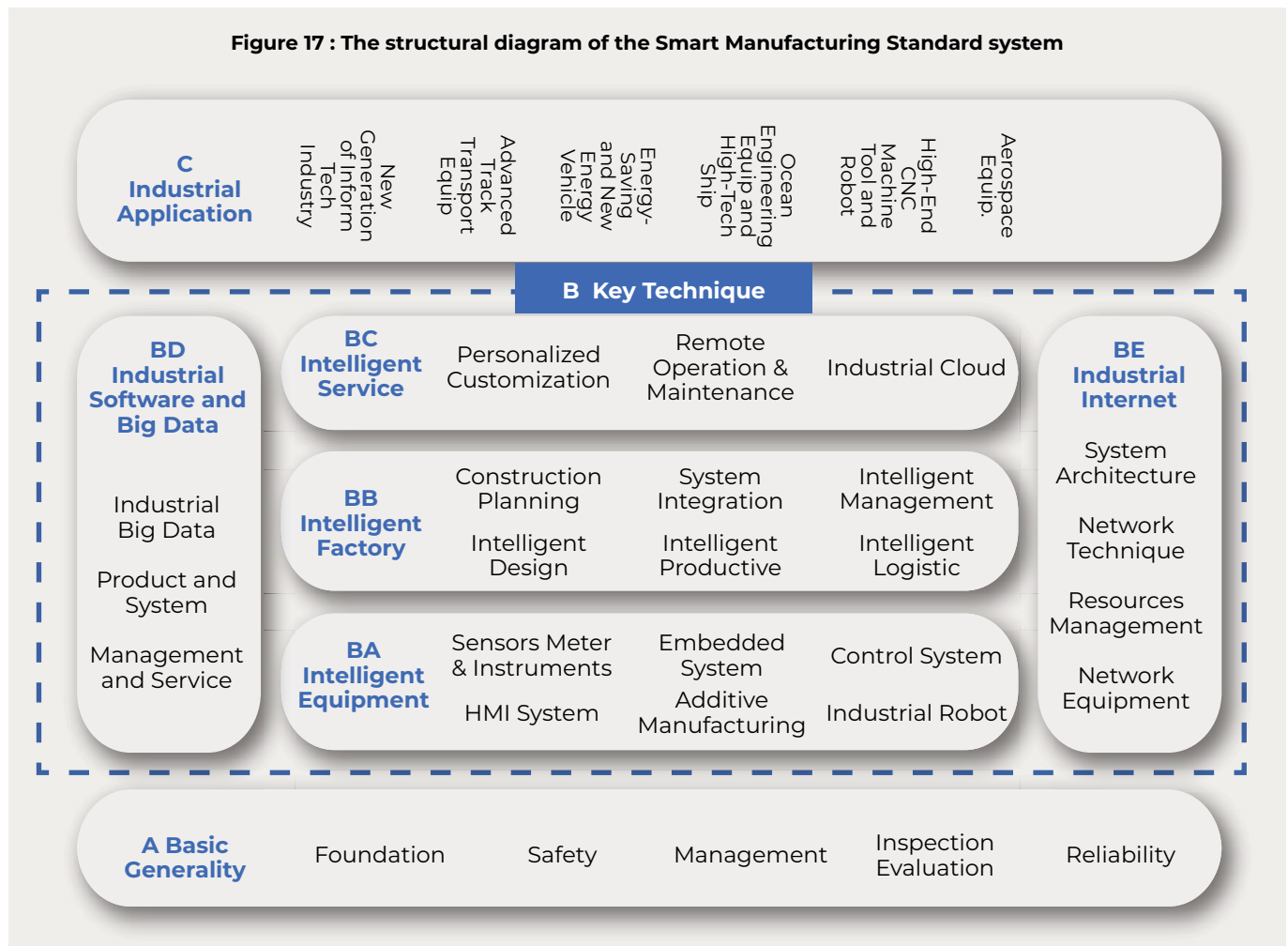
The second issue was related to issuing a temporary permit to the foreign mobile crane affecting the local market. The business concern was the unfair competition between local and foreign mobile crane owners. The perception was that the local mobile crane owners had to pay customs duties, apply for the AP, and undergo other related procedures to import mobile cranes, whereas the foreign companies were exempted from these procedures. Based on the investigation, the foreign companies also need to follow specific regulations which comparatively equivalent to the local companies. The case was not put forward for further action.

The third issue was the burdensome requirements to obtain COA to import iron and steel products. The issue was the double-testing, where SIRIM required imported iron and steel products to be sampled and tested by SIRIM to meet the Malaysia

Standard (MS), even though the product was tested at a foreign accredited lab approved by SIRIM and met the equivalent international standard. The other issue was the time taken by SIRIM to test and produce the COA, which was between 7 to 14 days. This incurred additional costs to the industry players. Two recommendations were concluded; 1) SIRIM to recognise International Standards (ISO) and give exemption to the products that have met the ISO and automatically issue the CoA without having to test such product; and 2) SIRIM to provide clear and transparent client charter regarding the process and duration of the testing and inspection requirement to obtain CoA for the importation of iron and steel products.

The fourth concern was on the safety passport issued by NIOSH (National Institute of Occupational Safety and Health). The business concern was the requirement to send employees to attend multiple safety courses conducted by NIOSH with similar contents, which was time-consuming and costly (estimated around RM256 per course). For the low-risk industry, the same training can be simplified. The issue has been put forward with two recommendations to the authority; 1) Propose the online course, and 2) Application of single card for multiple courses.

Figure 17 : The structural diagram of the Smart Manufacturing Standard system



IN-PROGRESS INITIATIVES TO ADDRESS THE CURRENT INDUSTRY CONCERNS

Accelerate talent development to enhance the competency level of M&E in technology :

1 Outreach programme to build community through webinar series

MEPN Webinar Series comprise online sharing sessions and awareness programmes to promote MEPN initiatives on digital transformation, human capital, mindset change, and productivity improvement.

2 Process Improvement Programme through Technology

The Process Improvement through Technology develops future talent by improving the quality of education and training programmes to meet future demands and cultivate industry-ready talent. MEPN absorbs the practical side, which is the simulation/games into the programme. MEPN collaborates with MEIF-TVET strategic partners from UTeM, ILP Pedas, GMI, UniKL, SGRDC, NSSDC, KISMET and MWJS.

Accelerate digitalisation adoption to improve the competitiveness of manufacturing and services in the M&E industry :

1 Business Advisory Clinics and Fact-Finding Mission

This programme aims to assist enterprises in the M&E subsector and serves as a channel to raise matters of mutual interests and challenges arising from the MCO. The programme focuses on disseminating information on assistance available, promoting networking with financial institutions, and promoting awareness and intervention programmes on productivity improvement.

2 Field Service Management (FSM)

FSM is chosen to be the pilot project to 'push' Malaysia's M&E companies to start embracing digital technologies using software, workflows, and communication solutions to enhance teamwork and improve productivity within the organisation.

Elevate the M&E subsector to the international standard to enhance the industry competitiveness :

1 Industry Cluster

This project is based on the evidence that productivity grows through collaboration. Collaboration through industry cluster consolidates and rationalises industry players to provide solutions and growth support within the country's manufacturing sector. The aim is to enable a swift transition towards high technology, capital intensive, and high value-added industry. MEPN believes that an initiative's outcome is more impactful through strategic and innovative collaboration.

2 Substandard Product Importation and Local Production

Regulatory delays in inspection and their associated approvals by regulators lead to unnecessary delays and added costs to M&E businesses. MEPN will identify the most significant pain points for priority streamlining to achieve better process efficiency for the ease of doing business. Among other industry issues that undergo the streamlining process through Reduced Unnecessary Regulatory Burdens (RURB) are substandard product importation and local production.

FORWARD-LOOKING RECOMMENDATIONS TO INCREASE THE MACHINERY AND EQUIPMENT SUBSECTOR PRODUCTIVITY

Malaysia's M&E subsector industry is relatively strong. It assumes the strategic importance of the country's economic transformation in the primary, manufacturing, and services sectors. Nevertheless, the supporting industries comprising the supply chain are fragmented. Malaysia's M&E builders are mainly export-oriented and not sustainable if they depend on only the domestic market. Outsourcing parts and components to the supporting industries is the critical strategy to remain competitive globally.

The establishment of the M&E industry cluster is expected to strengthen the M&E supply chain ecosystem. The cluster concept is the answer to a supply of competitively priced parts, components, and services to the M&E industry. The M&E industry cluster aims to form a group of M&E companies, where the cluster members will support each other. The group formed must have the synergy to materialise and develop the cluster and position it as an advantage to the cluster members in terms of business growth, potential investment, productivity and competitiveness.

Successful establishment of the M&E industry cluster is expected to contribute to the expansion and growth of Malaysia's M&E subsector, as stipulated in and the Twelfth Malaysia Plan. The M&E industry cluster may give the industry a new breath to

compete in higher value chain segments and expand international exports. In collaboration with M&E industry associations, the Machinery and Equipment Productivity Nexus (MEPN) is piloting the first M&E industry cluster. Successful establishment of the industry cluster requires endorsement and support from MITI.

Boosting digital adoption among the M&E players requires support from the government in the form of grants and incentives, which will help enhance their technologies and specialties towards becoming strong niche market players. Productivity improvement intervention programmes for the M&E players can be in field management, digital mastery, process automation, and the Internet of Things.

In addressing the shortage of skilled production workers and the mismatch between curriculum and industry needs, a partnership between the relevant government bodies and industry associations is necessary to upskill the existing workforce. Potential collaborations may include organisations such as MEIF and its associations, TVET Institutions such as UTeM, ILP Pedas, GMI, UniKL, SGRDC, NSSDC, KISMEC and MWJ, and government agencies such as JPK, MOHR, MITI, MIDA, MATRADE, Talent Corp, PERKESO, and My Future Job.

THE WAY FORWARD FOR THE MACHINERY AND EQUIPMENT SUBSECTOR

The M&E subsector contributes to the critical linkages with all subsectors, including ESS and E&E. Hence the growth performance of the M&E subsector in addressing productivity challenges will significantly provide spillover effects to other industries.

Machinery and Equipment Productivity Nexus (MEPN) aims to strengthen its role at the sectoral and enterprise level to hasten productivity growth in the M&E subsector through technology and digital adoption, as aligned with the government's goals Industry4WD. Industry players in the manufacturing sector must leverage digitalisation and technology adoption in 2022 to boost productivity growth and revive the economy.



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