



MINISTRY OF INTERNATIONAL
TRADE AND INDUSTRY



Industry4WRD

NATIONAL POLICY ON INDUSTRY 4.0



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Perpustakaan Negara Malaysia

Cataloguing-in-Publication Data

Industry 4WRD : NATIONAL POLICY ON INDUSTRY 4.0.

ISBN 978-967-13593-6-5

1. Manufacturing industries--Malaysia.
2. Government publications--Malaysia.

338.476709595

PUBLISHED BY:



MINISTRY OF INTERNATIONAL
TRADE AND INDUSTRY

Menara MITI, No. 7, Jalan Sultan Haji Ahmad Shah,
50480 Kuala Lumpur, Malaysia.

Tel : 603-8000 8000

Fax : 03-6206 4693

Email : webmiti@miti.gov.my

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MITI, 2018

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ACKNOWLEDGEMENT

Due to the breadth and depth of the manufacturing industry and its related services, this document was prepared through consultations with multiple ministries, agencies and industry players. The topics covered are linked to Malaysia's business and competitive advantages and the drivers, potential disruptors and technology developments in the manufacturing industry and its related services.

This document targets a range of stakeholders, with the aim of encouraging manufacturing firms to work with the entire manufacturing ecosystem to address the challenges and act on the identified enablers.



TECHNICAL WORKING GROUPS

Technical Working Groups were created and led by respective ministries and agencies in the identified focus areas to facilitate discussion amongst the stakeholders.



WORKSHOPS

A series of workshops were held to bring together ministries, agencies and manufacturing firms from a range of sectors, as well as representatives from the education and research community to discuss future opportunities and the needs of the manufacturing sector over a 10-year horizon.



INTERVIEWS

One-on-one interviews were held with top leaders within the manufacturing industry to supplement, test and refine the workshop outputs.



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Technical Working Group Leads

Ministry of Communications & Multimedia
 Ministry of Education
 Ministry of Human Resources

Ministry of Finance
 Ministry of Energy, Science, Technology, Environment
 and Climate Change
 SME Corporation Malaysia



Contributing Organisations

Agenzia Inovasi Malaysia (AIM)
 Akademi Sains Malaysia
 American Malaysian Chamber of Commerce (AMCHAM)
 Bank Negara Malaysia
 Collaborative Research in Engineering, Science and Technology (CREST)
 DreamEDGE Sdn. Bhd.
 East Coast Economic Region Development Council (ECERDC)
 Economic Planning Unit, Ministry of Economic Affairs (EPU, MEA)
 Federation of Malaysian Manufacturers (FMM)
 German-Malaysian Institute (GMI)
 Hanwha Q CELLS Malaysia Sdn. Bhd.
 Honeywell International Sdn. Bhd.
 Huawei Technologies (Malaysia) Sdn. Bhd.
 IAT Solution Pte. Ltd.
 Infineon Technologies (Malaysia) Sdn. Bhd.
 Intel Technology Sdn. Bhd.
 Invest KL Corporation Sdn. Bhd.
 iPlast 4.0 Pte. Ltd.
 Linde Malaysia Sdn. Bhd.
 Malaysia Automotive Institute (MAI)
 Malaysian Communications and Multimedia Commission (MCMC)
 Malaysia Digital Economy Corporation (MDEC)
 Malaysia External Trade Development Corporation (MATRADE)
 Malaysia Investment Development Authority (MIDA)
 Malaysia IoT Association
 Malaysia Productivity Corporation (MPC)
 Malaysian Technology Development Corporation (MTDC)
 Malaysian-German Chamber of Commerce & Industry (MGCC)
 Malaysian Industry-Government Group for High Technology (MiGHT)
 Malaysian Plastics Manufacturers Association (MPMA)

MARA Aerotech
 MIMOS Berhad
 Monash University Malaysia
 Multimedia University (MMU)
 NanoMalaysia Berhad
 National Instruments Malaysia Sdn. Bhd.
 National Professors Council (MPN)
 Penang Skills Development Centre (PSDC)
 Petrolim Nasional Berhad (PETRONAS)
 Siemens Malaysia Sdn. Bhd.
 SiTerra Malaysia Sdn. Bhd.
 SIRIM Berhad
 SME Association of Malaysia
 Department of Standards Malaysia
 Strand Aerospace Malaysia Sdn. Bhd.
 Talent Corporation Malaysia Berhad
 Taylor's University
 Universiti Kebangsaan Malaysia (UKM)
 Universiti Malaysia Perlis (UniMAP)
 Universiti Malaysia Sabah (UMS)
 Universiti Pertahanan Nasional Malaysia (UPNM)
 Universiti Putra Malaysia (UPM)
 Universiti Sains Islam Malaysia (USIM)
 Universiti Teknologi Malaysia (UTM)
 Universiti Teknologi MARA (UiTM)
 Universiti Teknologi PETRONAS (UTP)
 Universiti Tenaga Nasional (UNITEN)
 Universiti Utara Malaysia (UUM)
 All participants of Online Public Consultation



Special Consultations

Global Science and Innovation Advisory
 Council (GSIAC)

Global Federations of Competitive Council
 (GFCC)

A.T. Kearney

FOREWORD





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BUILDING FOR THE FUTURE

Malaysia is a trading nation. As a trading nation it is imperative for Malaysia to continuously seek to grow the market for the products it produces.

While Malaysia is abundant with natural resources, it is the manufacturing sector that has played a key role in turning Malaysia into a major player in the global value chain apart from rapidly turning the country into an industrialised nation.

In recent decades, the manufacturing sector has seen rapid evolution. From mass production through the use of intensive labour force in production lines, to the use of robotics to increase efficiency, the manufacturing industry is constantly evolving with more and more infusion of automation. Today, the next phase of evolution is referred to as the Fourth Industrial Revolution or Industry 4.0.

The term itself may seem meaningless as revolution is tied to evolution, a dynamic ongoing process of improvement. But technology, without the knowledge of application will not contribute to improvement.

Therein lies the substance in the term Fourth Industrial Revolution. Essentially what it entails is infusing higher value-added process of manufacturing through the application of advanced digitisation, advanced manufacturing technologies and efficient resource utilisation.

This would result in enhanced efficiency and reduced dependency of human labour and ultimately driving competitiveness going forward.

Will this be disruptive to the way we are used to doing things? Again, the substance lies in the application of available technology. We have seen how application of information technology and the internet of things have opened up market supply chains easing access to produce from the most remote of areas, bringing wealth and prosperity to the rural areas.

Likewise, Industry 4.0 could address many issues concerning manufacturing with regard to i.e. hazardous environments, health and safety of human labour, efficiency in managing supply chains, reduction in wastages, savings in time with efficient management of delivery systems. The potential for growth is simply limitless, but it all boils down to knowledge in application.

Already at the global front, the manufacturing sector is reimagining the future of manufacturing where conventional models are making way for greater technology adoption and the key determinants are efficiency, speed and flexibility towards sustaining competitiveness.

In Malaysia, there is a clarion call for the manufacturing sector to shift to higher value-added process, digitisation, advanced manufacturing technologies and efficient resource utilisation to drive competitiveness going forward.

A strong manufacturing sector would pave the way to enhanced productivity, job creation, innovation capacity, high-skilled talent pool and ultimately economic prosperity and societal well-being. This would position Malaysia as a primary destination for smart manufacturing globally and attract more high-tech investments.

I believe that this can all be achieved through the Industry4WRD: National Policy on Industry 4.0, which would enable the manufacturing sector to move into Industry 4.0 and along the way contribute to fulfilling Malaysia's commitment to the United Nation's Sustainable Development Goals (SDGs).

I would like to express my appreciation to all parties who have provided their valuable input and support towards formulating this Policy. I look forward to all stakeholders combining strengths to realise the future competitiveness of the Malaysian manufacturing sector.

Let us embrace change, collaborate, innovate and transform to create value and impact.

Thank you.



YAB TUN DR. MAHATHIR BIN MOHAMAD

Prime Minister of Malaysia

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FOREWORD



CLARION CALL FOR ACTION

The Fourth Industrial Revolution was the centrepiece of conversations at the World Economic Forum (WEF) on ASEAN in Kuala Lumpur, Malaysia in June 2016, in Phnom Penh, Cambodia in May 2017 and in Hanoi, Vietnam in September 2018. Numerous forums have heaped on the trend and discussions have been concentrating on how the Fourth Industrial Revolution would impact the businesses and the entire society at large.

While some would look at this as a potentially massive opportunity, there are concerns among the majority of firms and industry sectors as to how the Fourth Industrial Revolution would transform both the products and services that will be offered, and the processes or business models that are used to generate them. The Government, business firms and academia are now looking at how best to react towards this trend.

With this in mind, the Ministry of International Trade and Industry has taken the proactive measure to develop this National Policy on Industry 4.0, with the objective of transforming the Malaysian manufacturing industry and its related services to be smart, systematic and resilient.

The goal for the future of manufacturing industry is not only to “make better things” by creating innovative products and services, but also to “make things better,” by improving design, engineering, service planning and execution, management and production processes.

The overarching philosophy behind this Policy is A-C-T - Attract, Create and Transform.

- Attract stakeholders to Industry 4.0 technologies & processes;
- Create the right ecosystem for Industry 4.0 technologies to be adopted and to nurture innovations; and
- Transform capabilities of the manufacturing industry to be Industry 4.0-ready.

Although this Policy is designed for the manufacturing industry and its related services, the strategies are also applicable and could be replicated in other industries as well, albeit with different sets of priorities and action plans.

I am heartened to note that within the Government, the support and cooperation given have been overwhelming where the Technical Working Groups (TWGs) headed by the Ministry of Finance, Ministry of Communications & Multimedia, Ministry of Education, Ministry of Human Resources, Ministry of Energy, Science, Technology, Environment and Climate Change and SME Corp. have worked tirelessly to provide inputs throughout the development of this Policy. Extensive consultations were also undertaken with the industry and other stakeholders.

Various initiatives supporting the implementation of this Policy have already been announced. Hence, by the time this publication is in your hand, some of the action plans would have already been rolled out.

The key to moving forward is to collaborate.

Therefore, I am taking this opportunity to call on all stakeholders to view this Policy objectively and work together with the Government to deliver the strategies and action plans towards strengthening Malaysia's competitiveness in the long run.



YB DATUK IGNATIUS DARELL LEIKING

Minister of International Trade and Industry, Malaysia

FOREWORD





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GETTING THE MANUFACTURING INDUSTRY READY

The rapidly-evolving global manufacturing landscape calls for manufacturing firms to re-evaluate their current approaches and strategies to remain relevant and competitive.

This Policy, in essence, outlines 13 broad strategies for Malaysia to embark on a journey that will transform the manufacturing industry landscape over the next decade. MITI believes that this journey towards Industry 4.0 adoption is anchored on three shift factors: People, Process and Technology.

People: putting people and the entire organisation as a priority. This Policy focuses on strategies towards creating differentiated talent acquisition, developing the required human capital and retaining our existing talents by providing them with the right support.

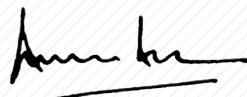
Process: improving the manufacturing and the whole business processes by encouraging smart and strategic public-private partnerships. We remain committed to ensuring the manufacturing sector continues to contribute significantly to the nation's economic prosperity. To propel this further, we are working towards improving the business environment to reform unfavourable or overly-bureaucratic policies, attracting high value investments for greater economic development and strengthening the overall infrastructure for the manufacturing sector, while seeking greater partnerships with the industry.

Technology: advancement and convergence of technologies are increasingly underpinning global manufacturing competitiveness. We acknowledge that many leading manufacturing firms have started to adopt and implement smart manufacturing solutions where advanced hardware are now combined with advanced software, sensors as well as data analytics. This move has resulted in smarter products, processes, and more closely connected customers and suppliers along the firms' value

chains. The Government's role in the whole transformation process is as an enabler, as such, this Policy is aimed at ensuring the adoption of Industry 4.0 technologies is done as seamless as possible, and that those technologies are equally accessible to SMEs.

We would also like to see greater leverage on the strength of ecosystem partnerships beyond traditional manufacturing boundaries. These strategies which are aimed at embracing a broader ecosystem approach as well as developing and taking advantage of integrated manufacturing and technology clusters and partners, are key determinants in moving forward. We need to develop a balanced approach across the whole ecosystem as increasingly sophisticated tools and strategies will be required to optimise the manufacturing industry from talent, technological, operational, financial, tax and regulatory perspectives.

This Policy is not a panacea to all issues surrounding the industry. What we are hopeful for is for it to provide the basis and support for firms to do things differently in order to stay competitive. For that to happen, the Government hopes that the Policy would serve as the impetus for our industry to make the leap into Industry 4.0.



DATUK ISHAM ISHAK

Secretary General

Ministry of International Trade and Industry, Malaysia

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GLOBAL OVERVIEW

The Inevitable Transformation
Driven by Multiple Factors
Advancement and Convergence of Technologies
Competitive Response by Nations & Lessons Learnt

GLOBAL OVERVIEW



THE INEVITABLE TRANSFORMATION

The world is currently amidst a technological transformation that will fundamentally change the way we live and work. It is difficult to predict precisely how this transformation will impact different industries and countries. However, we know that this transformation is unlike anything we have seen before due to the sheer pace and breadth of these changes.

Many see these changes as an ushering of new era of growth, change and opportunity. The ramifications it brings for manufacturing firms is forcing nations and governments to re-evaluate how the manufacturing industry operates and contributes to economic growth. Nations are now increasing their focus on developing advanced manufacturing capabilities by investing in high-tech infrastructure and quality education. These are done by facilitating the transformation of the manufacturing industry to the next technology frontier and raising their economic wellbeing.

The First Industrial Revolution started with the advent of steam and water power, enabling mechanisation of production processes, while the Second Industrial Revolution was driven by electric power and mass manufacturing techniques. Information technology and automation brought in the Third Industrial Revolution. The Fourth Industrial Revolution is exploding on the back of a range of technologies that are blurring the distinction among physical, digital and biological spaces.

Industry 4.0 transforms how products are designed, fabricated, used and operated as well as how they are maintained and serviced. It will also transform the operations, processes, supply chain management and energy footprint of factories.



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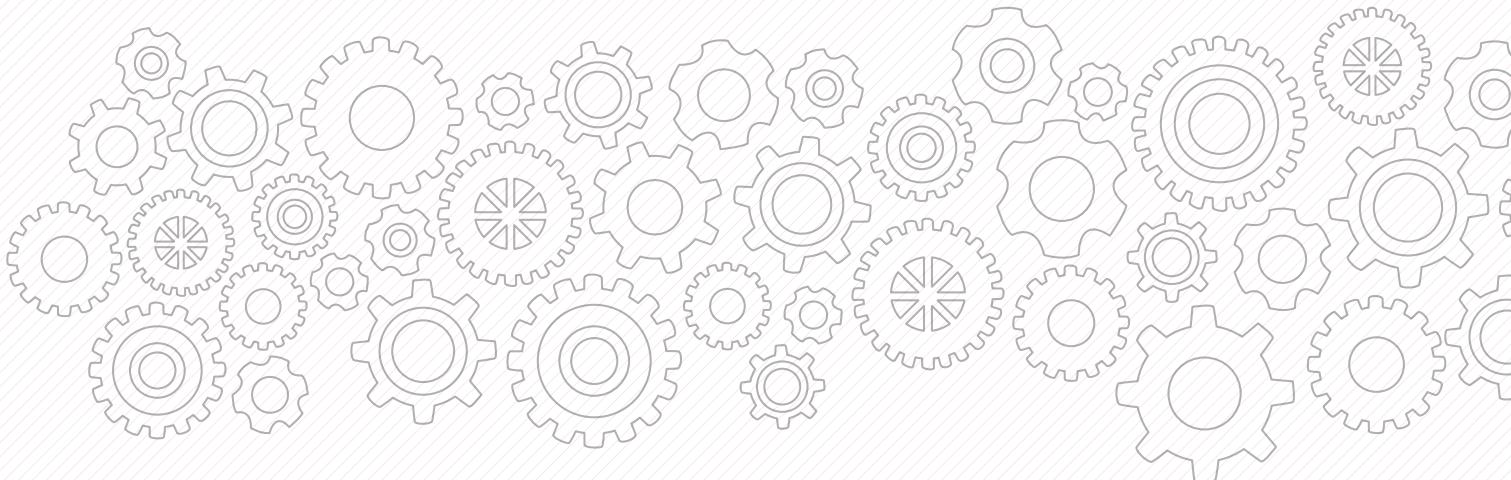


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Industry 4.0 changes the global landscape of manufacturing competition, reducing the relative competitive advantage of low-cost regions that rely on cheap labour. Nations and manufacturing firms that lead in embracing Industry 4.0 technologies and processes will gain over global competitors. This competitiveness hinges on the ability to transform by responding to market shifts and technology trends. The

transformation of the manufacturing industry, through Industry 4.0, is also in line with the United Nation's Sustainable Development Goals (SDGs), especially in support of Goal #9 and Goal #12.



GOAL #9

INDUSTRY, INNOVATION
AND INFRASTRUCTURE



Build resilient infrastructure, promote sustainable industrialisation and foster innovation. Inclusive and sustainable industrial development is the primary source of income generation, allows for rapid and sustained increases in living standards for all people, and provides the technological solutions to environmentally sound industrialisation. Without technology and innovation, industrialisation will not happen, and without industrialisation, development will not happen.

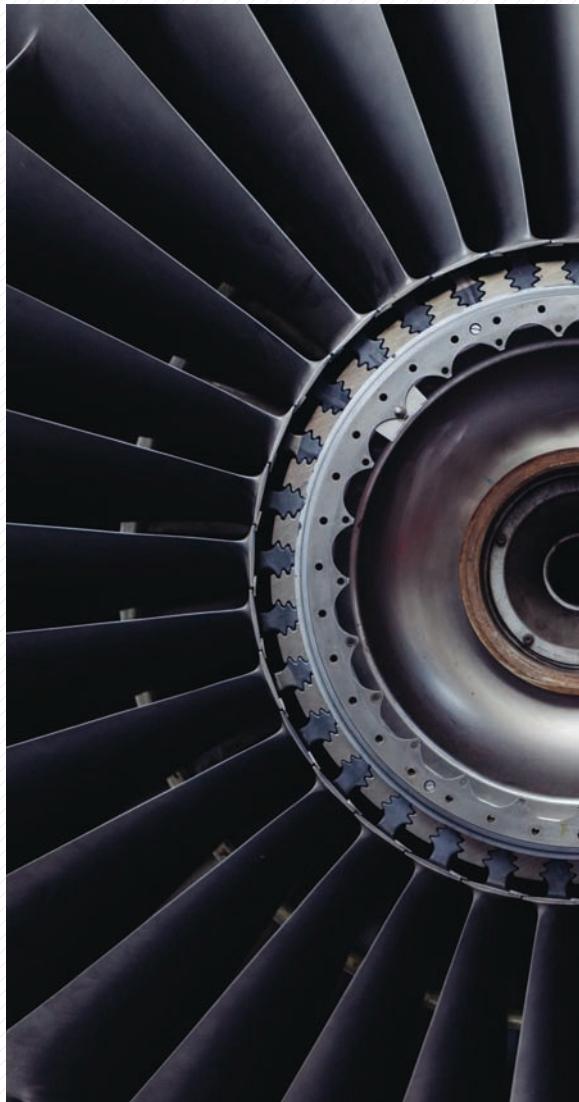
Ensure sustainable consumption and production patterns. Sustainable consumption and production is about promoting resource and energy efficiency, sustainable infrastructure, and providing access to basic services, green and decent jobs and a better quality of life for all. Its implementation helps to achieve overall development plans, reduce future economic, environmental and social costs, strengthen economic competitiveness and reduce poverty.

GOAL #12

RESPONSIBLE
CONSUMPTION
AND PRODUCTION



GLOBAL OVERVIEW



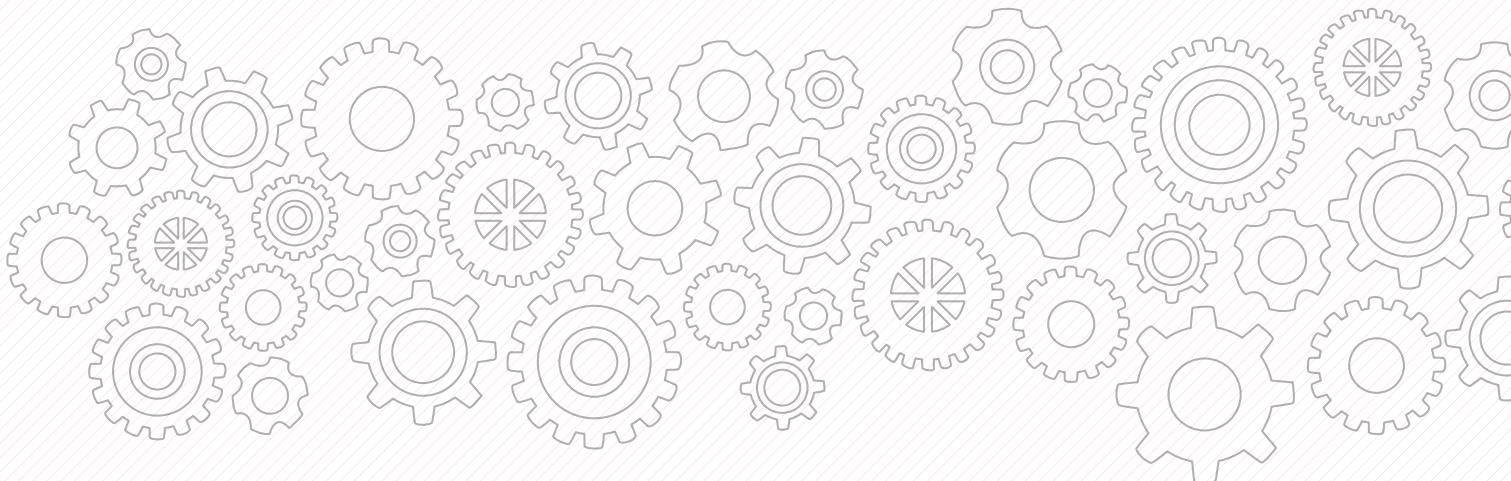
DRIVEN BY MULTIPLE FACTORS

The manufacturing industry is increasingly shifting towards producing more technologically-complex products.

It is no longer enough for the manufacturing industry to make better things - creating innovative products and services that will meet customer needs - but also to make things better - facilitating the design engineering, service planning and execution as well as improving the management and production processes. Furthermore, despite steady improvements in the manufacturing output and employment in the sector, renewed investments will be needed to build the necessary infrastructure and increase resources to support the continuous growth.

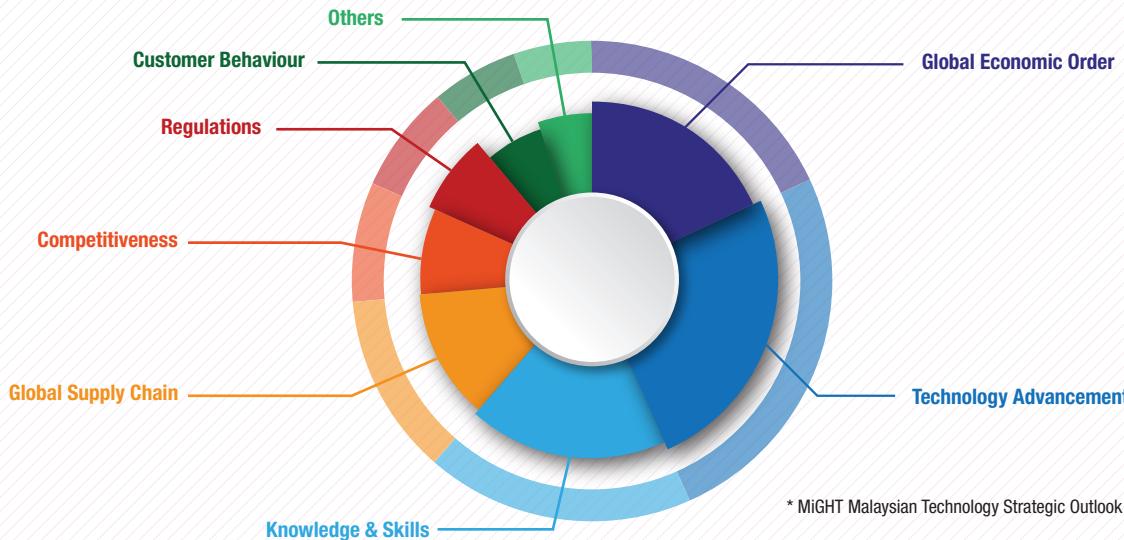
This emphasis on “making better things while making things better” is driven by the following factors:

- Shifts in the global economic order - the rise of China, economic realignment due to changes in the developed world, and the rise of fast-growth emerging economies;
- Rate of technology advancement and its convergence - technological changes driven by applications of these technologies in the manufacturing industry, such as big data, the Internet of Things and cloud computing;
- Knowledge and skills for the future - retaining talent and producing future workforce by taking advantage of the opportunities of this transformation;
- Global supply chain dynamics – increasing complexity in the supply chain networks caused by distributed sourcing, engineering and production as manufacturing firms now manage partners in a borderless world not bound by geographical locations;



- Competitiveness of nations and firms - greater global competition as firms must defend their domestic markets while simultaneously tapping into new market segments for long-term growth;
- Increased regulations - environmental concerns and standards-based factors like ISO compliance that apply across an increasingly interconnected world; and
- Changing customer behaviour – influenced by values, personalisation and customisation, and the emergence of new products and services attributes that are forcing firms to reassess their manufacturing systems.

Industry 4.0 Transformation Drivers

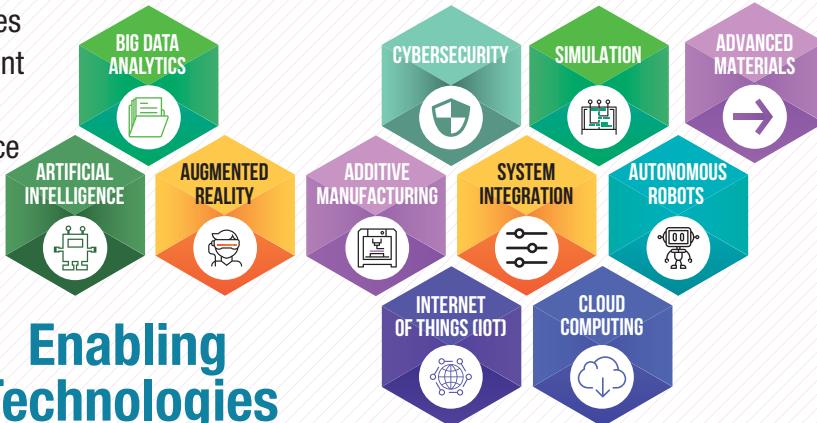


GLOBAL OVERVIEW

ADVANCEMENT AND CONVERGENCE OF TECHNOLOGIES

At the heart of Industry 4.0 is a set of rapidly evolving and converging technologies. These are pushing the boundaries of what can be manufactured through additive manufacturing and advanced materials. These technologies are enabling richer insights through big data analytics. They are blurring the lines between physical and digital realms through rich simulations and augmented reality. They are enhancing human capacity through artificial intelligence and autonomous robots. We are also seeing a shift in the way information technology is being used through cloud computing, system integration and the Internet of Things (IoT). Last but not least, cybersecurity plays an important role in ensuring information systems and manufacturing lines are protected from cybercrime threats.

Technologies advancement and convergence



Enabling Technologies

The digitalisation of the production-based industries are driven by these technological drivers

These enabling technologies bring a new dimension to the industrial environment, resulting in a dramatic increase in industrial productivity.

GREATER EFFICIENCIES

Changing the traditional manufacturing system relationships among suppliers, producers and customers as well as between humans and machines.

INTEGRATION & AUTOMATION

The manufacturing systems would become fully integrated and automated as a result of digital adoption that will transform the industrial environment.

SELF ADAPTATION TO CHANGES

The environment will become unified by the connected systems that enable interactions within and between systems to allow self-configuration, failure prediction and be more adaptive to changes.



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Additive Manufacturing	Artificial Intelligence (AI)	Big Data Analytics	Advanced Materials	Cybersecurity
<p>Additive manufacturing is advancing with the use of new materials, opening completely new possibilities. For example, 3D printing of organic tissues has created opportunities for growing live organs. It is revolutionising traditional production, aided by a recent surge in metal additive printing.</p>	<p>AI is a concept that is made up of numerous subfields such as machine learning, which focuses on the development of programs that can teach themselves to learn, understand, reason, plan and act when exposed to new data in the right quantities. AI technology will supplement the smart factory towards networked factory, in which data from supply chains, design teams, production lines and quality control are linked to form a highly integrated and intelligent engines.</p>	<p>Increasingly big data techniques are being applied in manufacturing industry to improve customer experience and product quality, realise energy efficiency and conduct predictive maintenance. It is now possible to collect masses of data from several different sources to direct decisions that anticipate product or equipment failure.</p>	<p>New materials and nano-structures are being developed, allowing for beneficial material properties, e.g. shape retention and thermoelectric efficiency. Together with additive manufacturing technologies, it will allow for massive customisation and development of products that were not possible until now.</p>	<p>The industrial communication is expanding and strongly connected, as such, digital security becomes a critical aspect that must not be overlooked in the industrial environment. It has now become more complex as it consists of connected devices and environments that cannot be protected by traditional cybersecurity approaches. Current cybersecurity has largely been developed for IT-centric devices and environments.</p>

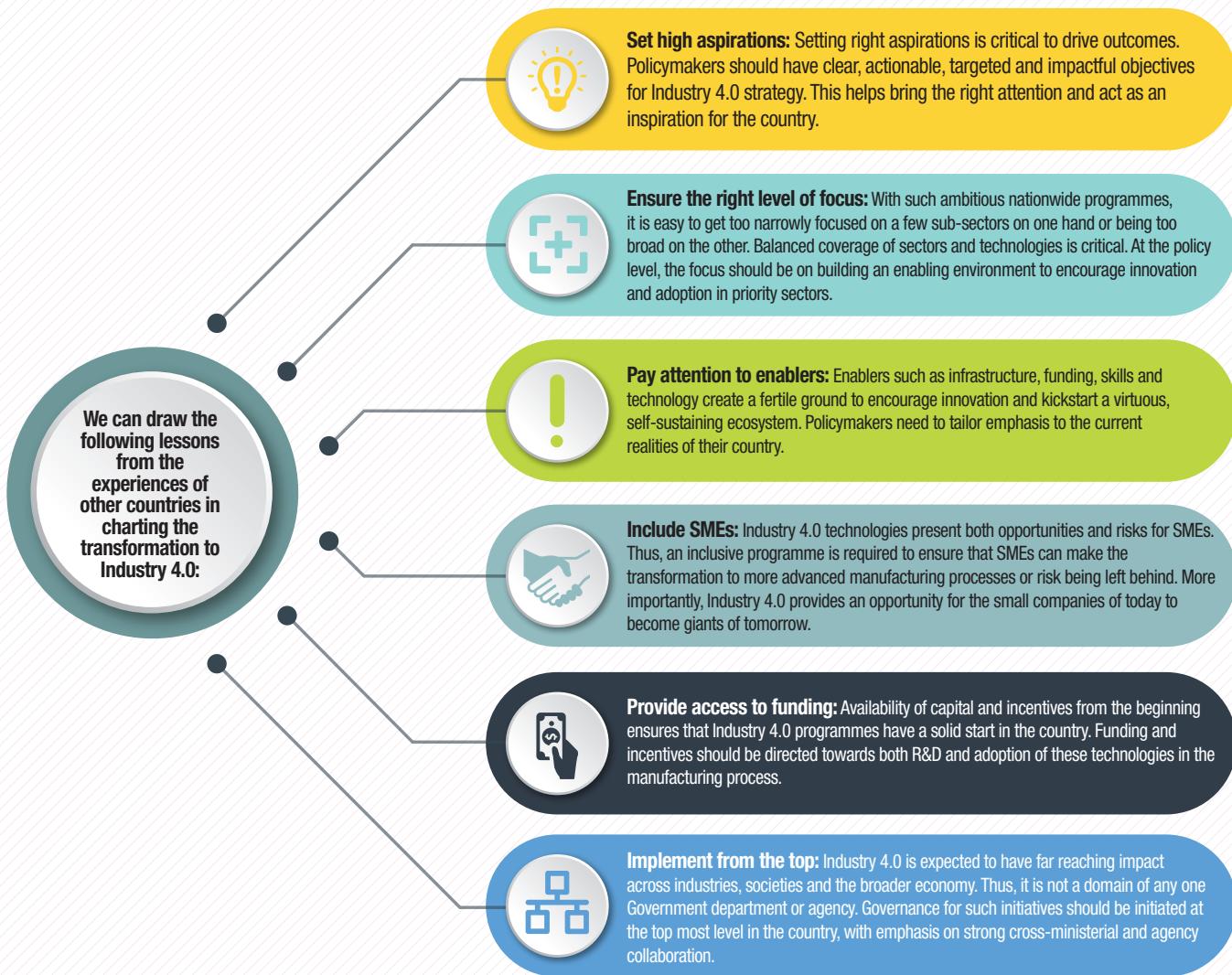
Simulation	Cloud Computing	Augmented Reality	Internet of Things (IoT)	Autonomous Robots	System Integration
<p>While many engineers are already familiar with simulations in the field of product design, the advent of augmented reality, AI and big data is expected to take simulations to the next level. It will be possible to simulate manufacturing processes using different production settings to find the optimal way to manufacture a product. Simulations can also be used to test product usage under different operating environment using different types of materials.</p>	<p>Past industrial revolutions required significant capital as a ticket for entry. With cloud computing, many of the Industry 4.0 technologies can be made available to even smaller companies as a utility with minimal upfront capital investment. Companies can leverage cloud-based product design, simulation, AI and big data solutions to improve their production processes and build products better suited for their customers.</p>	<p>While the initial augmented reality technologies are still in nascent stages, they are advancing at a rapid pace. Some of the first applications can be found in the delivery of information and training, e.g. augmented reality can be used to deliver part replacement instructions to maintenance staff in the field.</p>	<p>Industry 3.0 brought in an era of computing and interconnectedness but it often relied on humans to make even the most trivial decisions. Industry 4.0 technologies embody an unprecedented proliferation of sensors and connectedness among these sensors. Combined with other technologies such as AI and big data, it is now possible to envisage entirely autonomous systems that revolutionise manufacturing.</p>	<p>Machinery and robots are transformed towards their next generation. Robots can do more on their own, including learning on the job and teaming up with other robots and humans. This technology allows systems to think, act and react autonomously as well as conduct remote decision making. This can help contribute to a company's competitiveness, productivity and profitability.</p>	<p>System integration occurs in vertical (within the industry value chain) and in horizontal systems (across multiple value chains), eventually achieving end-to-end digital integration across the entire value chain.</p>

GLOBAL OVERVIEW

COMPETITIVE RESPONSE BY NATIONS & LESSONS LEARNT



Recognising the importance of the transformation of the manufacturing industry to their industrial future state, many countries have launched Industry 4.0 related policies and programmes to support the research, development and deployment of Industry 4.0 technologies and processes at their local manufacturers.



Several of the global and leading manufacturing countries have already embarked on their Industry 4.0 transformation and are in advanced stages of implementation, e.g. Germany, the US, the UK, China and Republic of Korea. It is critical for Malaysia to learn from these experiences and move fast in its own Industry 4.0 adoption to not fall behind in its global manufacturing position.



CASE FOR ACTION

Importance of the Manufacturing Sector in Malaysia

Need to Embrace Industry 4.0

Propelling SMEs Forward

Malaysia's Readiness for Industry 4.0

Addressing Malaysia's Issues & Challenges

CASE FOR ACTION



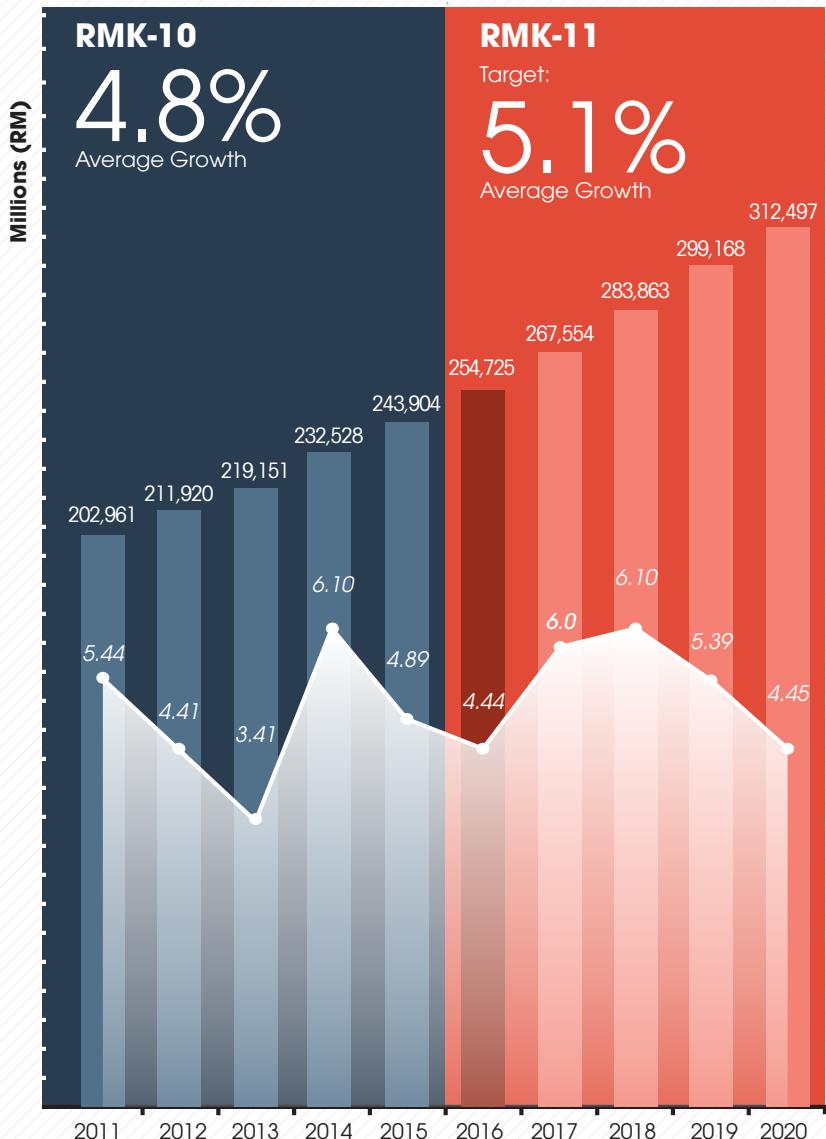
IMPORTANCE OF THE MANUFACTURING SECTOR IN MALAYSIA

The Malaysian manufacturing industry is an important economic sector contributing about 22% to the GDP in the last five years. To date, its growth has had the effect of stimulating jobs, attracting investments and creating business opportunities in the downstream activities and related services sectors. The manufacturing sector is expected to remain resilient and is on track to achieve the targeted annual GDP growth rate of 5.1% under the 11th Malaysia Plan (RMK-11).

It is important to note that the sector is made up of a large number of SMEs, which account for 98.5% of the manufacturing firms. Although most of these SMEs do not have a strong global presence, many have the potential to be global exporters. Together with other ongoing initiatives like the eCommerce Strategic Roadmap and the Digital Free-Trade Zone (DFTZ), the Government is trying to provide the right platform for SMEs to reinvent themselves and adopt the latest technologies to be globally competitive.

On a global level, Malaysia has been enjoying a fairly strong and competitive position in both manufacturing and the use of technology. The Global Manufacturing Competitiveness Index 2016 (by Deloitte Touche Tohmatsu) ranked Malaysia at 17th place among 40 countries. The report also projected Malaysia to climb four notches to 13th by 2020. On the technology and innovation side, the Global Innovation Index 2017 (by Cornell University, INSEAD and WIPO) ranked Malaysia at 37th globally among 127 countries and 8th in Asia. Further, the recent Readiness for the Future of Production Report 2018 (by WEF and A.T. Kearney) highlights that Malaysia is well-positioned to benefit from the future of Industry 4.0.

Malaysia's Manufacturing GDP contribution and growth



Manufacturing Industry Employment 2,119,158 employees

SMEs IN THE MANUFACTURING SECTOR



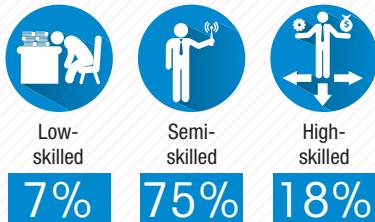
Source: Economic Census 2016 Manufacturing Sector, Department of Statistics, Malaysia

DEPENDENCY ON FOREIGN LABOUR



Source: Ministry of Human Resources

Skills Level



* Based on Malaysia Standard Classification of Occupations (MASC) 2013, referenced by Economic Census 2016

Qualification

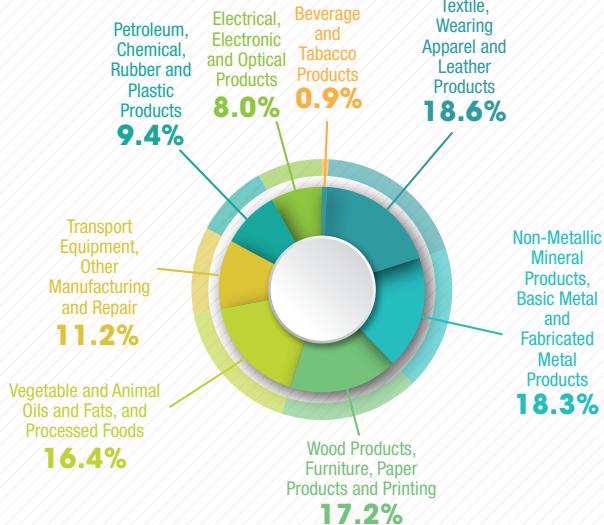


Source: Economic Census 2016 Manufacturing Sector, Department of Statistics, Malaysia

CASE FOR ACTION

NUMBER OF ESTABLISHMENTS BY MANUFACTURING SUB-SECTOR, 2015

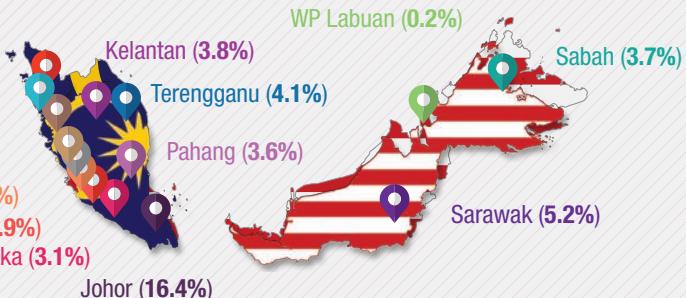
49,101 Establishments



Source: Economic Census 2016 Manufacturing Sector,
Department of Statistics, Malaysia

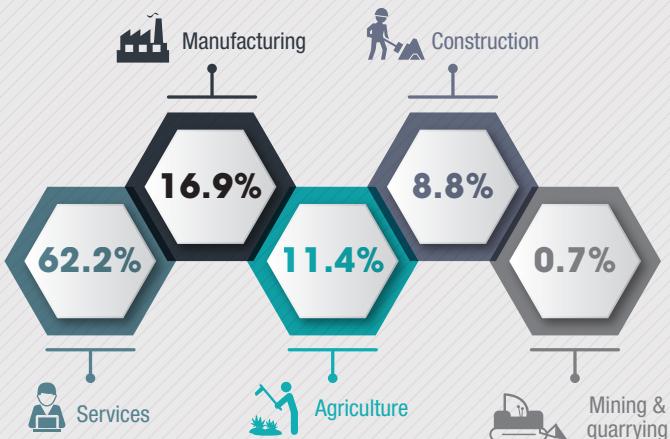
CONCENTRATION OF MANUFACTURING ESTABLISHMENTS IN MALAYSIA, 2015

Perlis (0.8%)
Kedah (6.7%)
P. Pinang (8.5%)
Perak (8.9%)
Selangor (20.4%)
Kuala Lumpur (10.7%)
N. Sembilan (3.9%)
Melaka (3.1%)



Source: Economic Census 2016 Manufacturing Sector, Department of Statistics, Malaysia

PROFILE OF EMPLOYED PERSONS, MALAYSIA, 2016



Source: Labour Force Survey Report 2016, Department of Statistics, Malaysia



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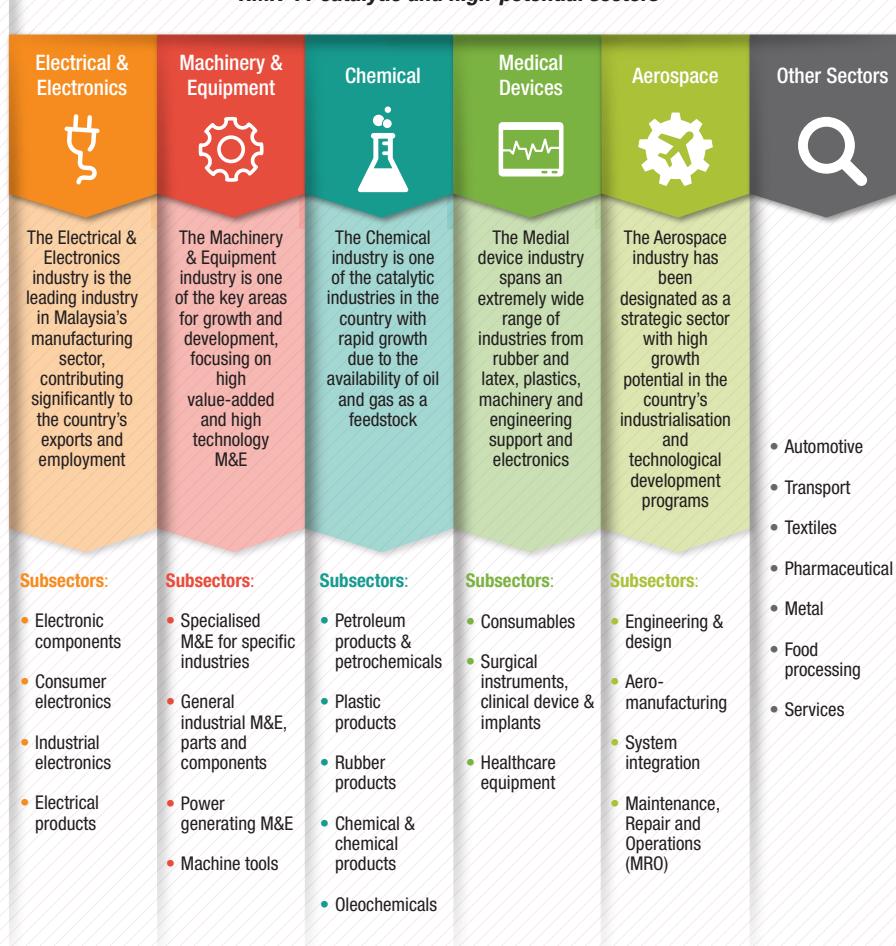
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NUMBER OF EMPLOYMENT BY MANUFACTURING SUB-SECTOR, 2015

	Employees (persons)	% Share	Value Added (RM Billion)
Electrical, electronic and optical products	528,913	25.0	77.6
Petroleum, chemical, rubber and plastic products	376,084	17.8	68.7
Non-metallic mineral products, basic metal and fabricated metal products	331,643	15.6	34.3
Wood products, furniture, paper products and printing	298,437	14.1	27.8
Vegetable and animal oils and fats and food processing	256,908	12.1	22.1
Transport equipment, other manufacturing and repair	207,959	9.8	17.2
Textiles, wearing apparel and leather products	102,243	4.8	5.0
Beverages and tobacco products	16,971	0.8	4.4
Number of employees	2,119,158	100	RM 257.1 billion

FOCUS SECTORS OF INDUSTRY 4.0

RMK-11 catalytic and high-potential sectors



Source: Economic Census 2016 Manufacturing Sector, Department of Statistics, Malaysia

CASE FOR ACTION



NEED TO EMBRACE INDUSTRY 4.0

Despite its strong current position, the state of the manufacturing industry has been a case for concern in the last few years. Malaysia has moved away from being an investment destination for low cost labour manufacturing activities and is challenged by lower cost competitors from emerging economies and rapidly changing technologies.

In line with the global trends outlined before, three major factors are impacting the future of manufacturing in Malaysia, offering opportunities for growth, but also challenging its competitive position:

- Global value chains and geographies of production are continuing to shift, especially as China and other Northeast Asian countries are relocating production to ASEAN. This is opening up new opportunities for Malaysia. However, Malaysia will need to transform itself fast as other countries in the region are catching up.
- Quality of labour and higher productivity, and not low labour cost, will be the new source of competitive advantage. Although Malaysia's labour productivity has grown at 3-4% over the last few years, its relative global position and use of high-skilled labour have not moved forward. Malaysia's labour productivity was ranked only at 44th position in 2016, a position that has remained unchanged since 2009. The relative share of high-skilled labour declined from 19% in 2010 to 18% in 2017.
- New technologies are disrupting and fostering a technology-based model of production. Barriers of adoption have come down with key Industry 4.0 technologies maturing and costs declining. Application of technologies to improve efficiency and product quality is becoming the new normal, requiring Malaysian manufacturing firms to innovate and invest in new technologies to remain competitive.

As such, it is imperative for Malaysia to transform itself at an accelerated pace and embrace Industry 4.0 as a critical cornerstone to propel and sustain its future manufacturing competitiveness. Specific attention needs to be given to four overarching goals:

- Drive continuous growth in manufacturing GDP;
 - Increase national productivity;
 - Create higher skill employment opportunities; and
 - Raise innovation capabilities and competitiveness.

PROPELLING SMEs FORWARD

In Malaysia's transformation, particular attention needs to be given to SMEs as they account for the bulk of manufacturing companies (98.5%) and a major part of employment (42%).

While most of the large manufacturing firms are already anticipating the benefits and risks of adopting Industry 4.0 practices, Malaysian SMEs appear to be cautious in taking the leap. Despite the enormous economic potential of Industry 4.0, SMEs in the industry remain relatively unaware about it. There is a risk that Malaysian SMEs might be left behind.

Industry 4.0 has the potential to transform manufacturing SMEs in multiple ways: improving productivity, efficiency and cost; enhancing organisational, management and production capabilities; enabling better quality monitoring; and developing innovators and producers of Industry 4.0 technologies.

The level of transformation required is, however, very substantial for SMEs. It will not just be about adopting Industry 4.0 technologies, but also about changing business processes and operating models. For example, SMEs will need to collaborate and participate in broader production networks with other SMEs, large firms or multinational corporations. Digitalisation of the manufacturing system will be important to build direct links to end customers and produce innovative and customised products.

Scale effects are also being redefined as SMEs are making headways in many markets and outperforming larger corporations due to their agility and adaptability. As such, manufacturing SMEs will need to learn how to deal with these disruptions, be more resilient and embrace the change as an opportunity.

SMEs stand to gain the most from this Policy. The aim is to optimise the framework conditions and support structures accordingly, so that manufacturing SMEs will be able to meet the challenges of Industry 4.0 and take full advantage of the benefits and opportunities it presents.

This will require a new and comprehensive policy framework that guides the transformation, systematically addresses potential barriers and fosters urgency and action across the industry and all other stakeholders.



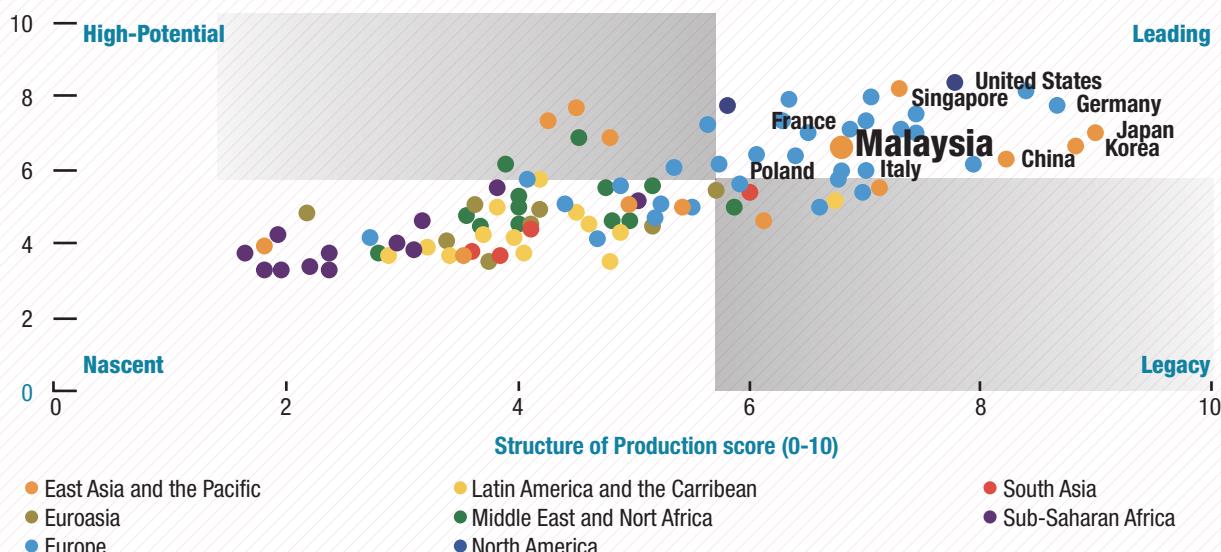
CASE FOR ACTION

MALAYSIA'S READINESS FOR INDUSTRY 4.0

A key question is how ready Malaysia is for Industry 4.0. The recent report on the Readiness for the Future of Production Report 2018, jointly published by the World Economic Forum (WEF) and A.T. Kearney, provides a global assessment of 100 countries and positions Malaysia in the “Leader” quadrant. These are countries with a “strong current production base” and who are “positioned well for the future”. It is also interesting to note that Malaysia and China are the only two non-high income countries in the “Leader” quadrant.

This is both an enviable and a challenging position for Malaysia. On the one hand, it underscores Malaysia's strong current manufacturing position and its readiness for Industry 4.0. On the other hand, it also highlights the economic value at stake if Malaysia is not able to transform itself in an accelerated manner. The gap to global leaders like Japan, Republic of Korea, Germany, Switzerland and China is still significant and other countries in the region have aggressive plans and are moving fast in their implementation.

Drivers of production score (0-10)



Note: Average performance of the top 75 countries is at the intersection of the four quadrants.

Source: Readiness for the Future of Production Report, World Economic Forum, 2018



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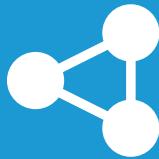
WEF's analysis identifies technology, human capital, global trade and networks, and institutional frameworks as key drivers of production for Industry 4.0. Malaysia's ranking in each of these drivers emphasises priorities in technology, human capital and institutional frameworks (21st to 30th position out of 100 countries), consistent with some of the challenges highlighted previously:



Technology adoption and diffusion are particularly important for SMEs and underscore the importance of creating production networks and collaborations with MNCs and large companies.



Human capital focus is key to creating an accelerated shift in productivity, especially as Malaysia has been relying on low labour cost in the past, with a declining share of skilled labour.



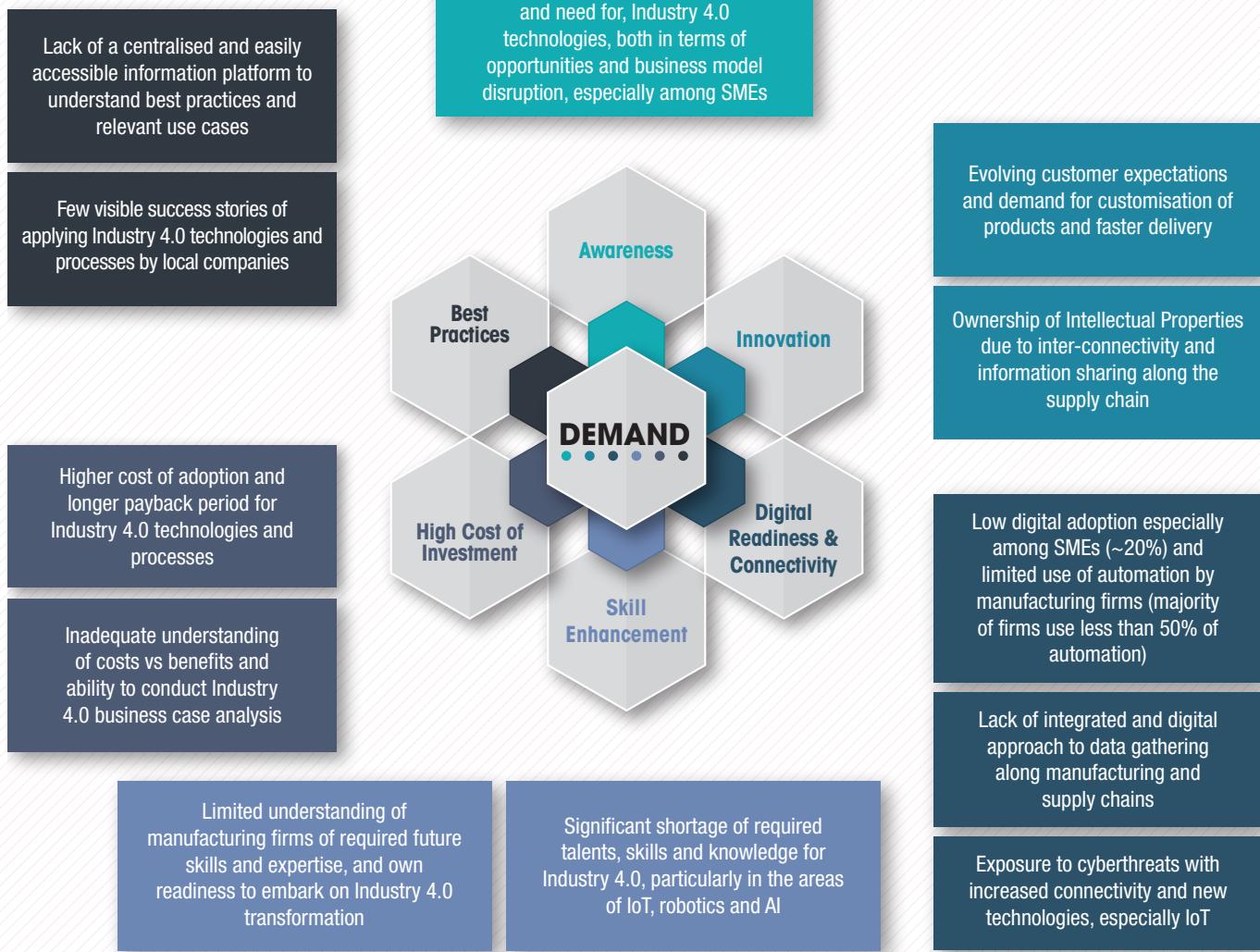
Strengthening institutional frameworks underpins the role of Government in creating the right ecosystem and facilitating collaborative platforms.



On global trade and investment, Malaysia is already well-integrated into regional value chains and exhibits a very good trade infrastructure, which is reflected in its strong global ranking (7th).

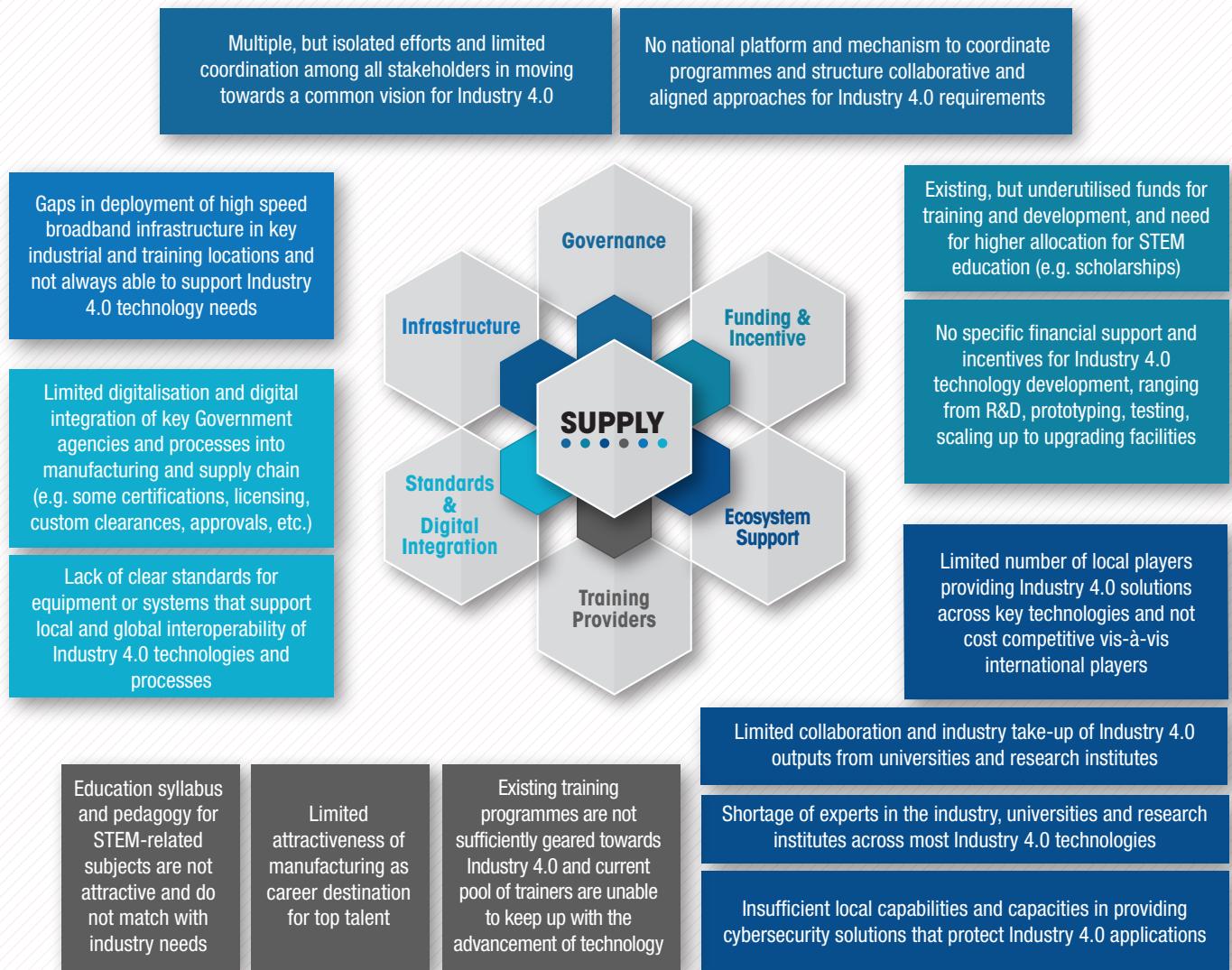
Source: WEF

Addressing Malaysia's Issues & Challenges



To ensure this Policy comprehensively addresses potential issues and challenges faced by Malaysian manufacturing firms, a series of industry and government agency workshops were conducted, involving a broad range of stakeholders.

The issues on both the demand and supply side are summarised as follows:



CASE FOR ACTION



MALAYSIA MOVING FORWARD...

From the stakeholder interactions and issue analyses, five themes emerge that drive the development of an end-to-end Industry 4.0 ecosystem in Malaysia. They have also been guiding the development of this National Policy on Industry 4.0 and the four key goals of GDP contribution, national productivity, high-skilled employment and innovation capabilities.



Upskilling and reskilling existing and future labour pool need to be at the heart of Malaysia's transformation



Inclusive involvement of SMEs is critical to power a holistic step up in labour productivity across the economy



Significant evolution in innovation capabilities and collaborative platforms is essential to foster the development of, and access to, cost-effective technologies that address specific sector needs



Focused funding support is needed to kickstart the adoption and complement private sector investments



Good digital infrastructure is required to enable reliable and secure Industry 4.0 operations





MOVING FORWARD

Policy Objectives
The Framework – Industry4WRD
Strategic Enablers & Actions
Implementation Approach

MOVING FORWARD



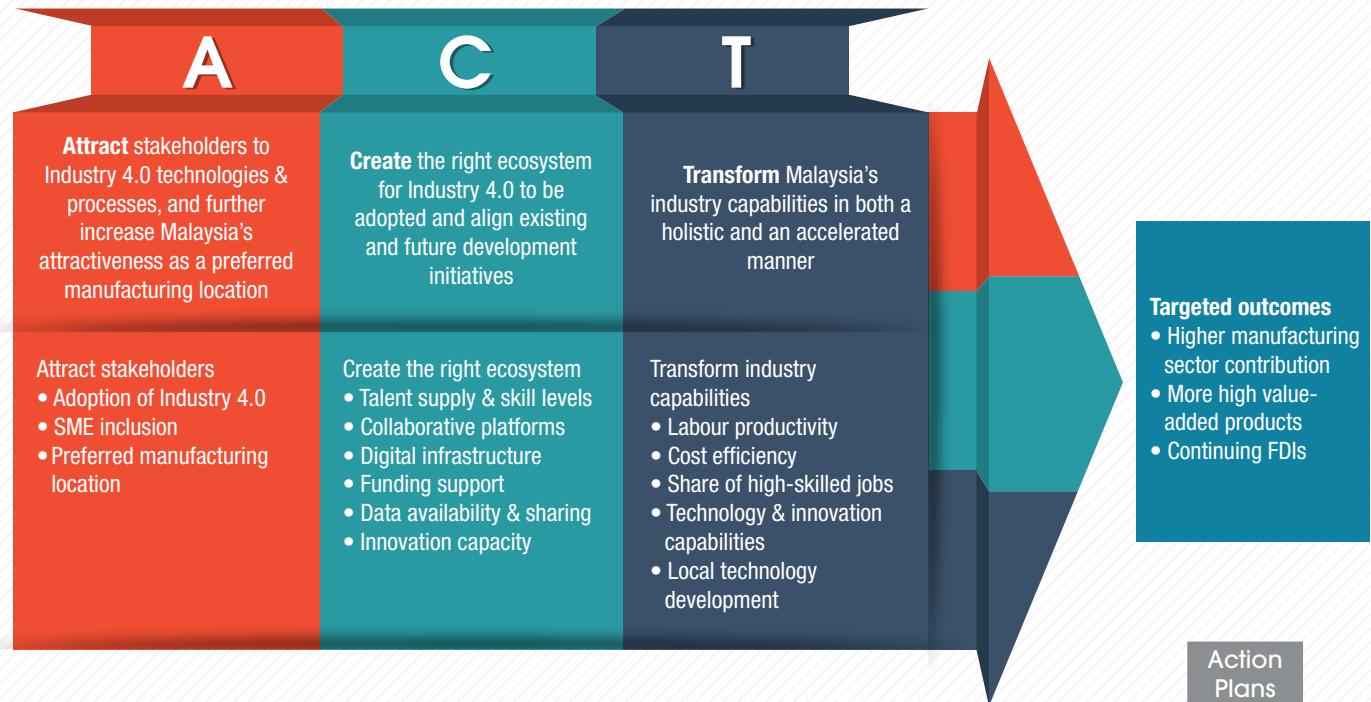
POLICY OBJECTIVES

Already, a number of initiatives and organisations have been established at national, state and regional levels by both the Government and industry to develop action plans to strengthen the manufacturing industry. This support for, and focus on, manufacturing firms are important. However, these initiatives have largely been developed independently and often have overlapping objectives and industry audiences.

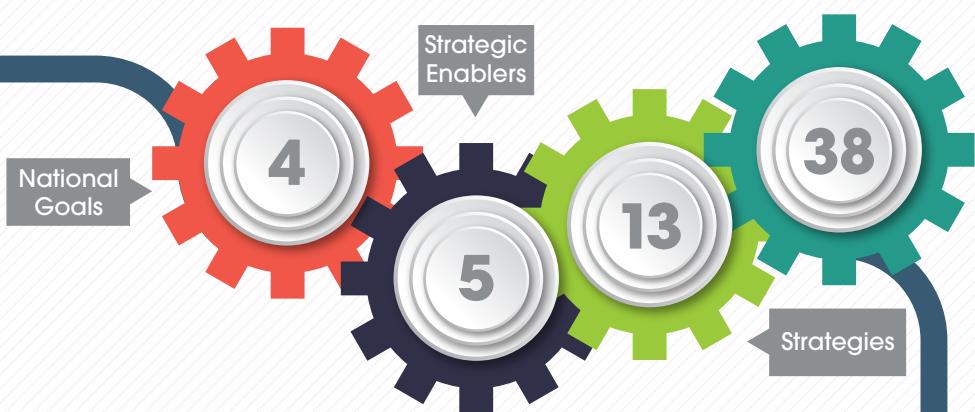
There is a need for a more streamlined and cohesive national agenda under which these initiatives and organisations can be integrated to accelerate Malaysia's transformation into a smart and modern manufacturing system. This will also include the need for a greater alignment across Government, research and academia regarding priority industries, specific goals, enabling actions, and their funding. Countries like Germany and Japan provide examples of best practices where Government, research and academia are tightly integrated with the manufacturing industry through collaborative public-private partnerships (PPPs) that develop innovative solutions for specific industry needs.

With this in mind, Malaysia has put in place the National Policy on Industry 4.0 – Industry4WRD – that provides a concerted and comprehensive transformation agenda for the manufacturing sector and its related services.

OBJECTIVES OF THE NATIONAL POLICY ON INDUSTRY 4.0 ARE THREEFOLD: A-C-T



NATIONAL POLICY ON INDUSTRY 4.0 BY THE NUMBERS



THE FRAMEWORK



Industry4WRD



The Vision

Malaysia's **vision** for the manufacturing sector in the next 10 years

Strategic partner
for smart
manufacturing &
related services in
Asia Pacific

Primary
destination for
high-tech industry

Total solutions
provider for
advanced
technology



The National Goals

Specific **goals** to
guide and measure
the progress of
transformation

Labour
Productivity
Growth

Manufacturing
Contribution to
Economy

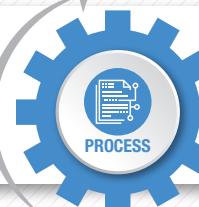
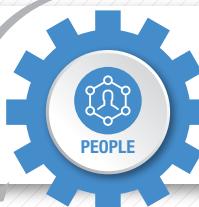
Innovation
Capacity

High-skilled Jobs



The Shift Factors

A set of **shift factors**
that need to be
optimised in a
balanced manner



The Enablers

Specific
enablers that
determine the
strategies,
policies and
action plans



FUNDING
Funding &
Outcome-based
Incentives



INFRASTRUCTURE
Enabling
Ecosystem &
Efficient Digital
Infrastructure



REGULATIONS
Regulatory
Framework &
Industry Adoption



**SKILLS &
TALENT**
Upskilling
Existing &
Producing
Future
Talents



TECHNOLOGY
Access to
Smart
Technologies



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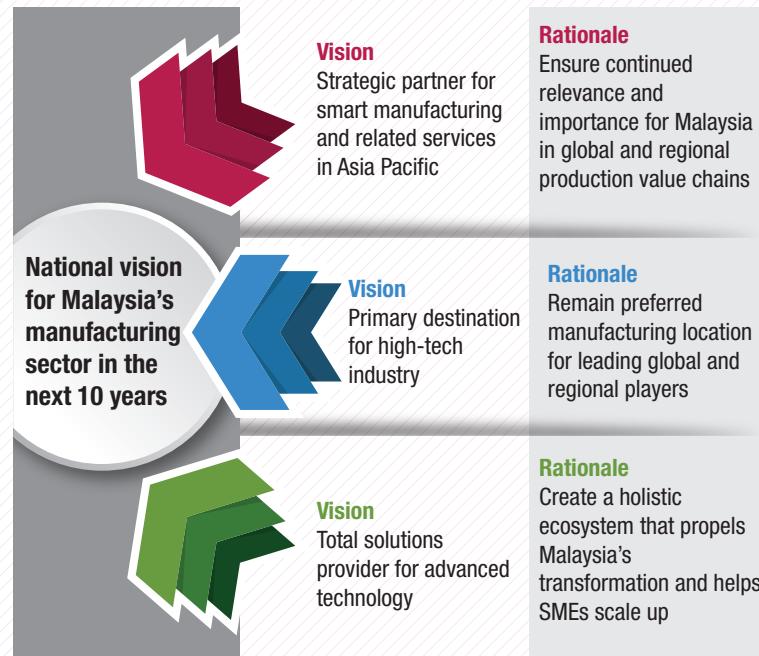
TRANSFORM

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ENVISIONING THE FUTURE OF MALAYSIAN MANUFACTURING INDUSTRY

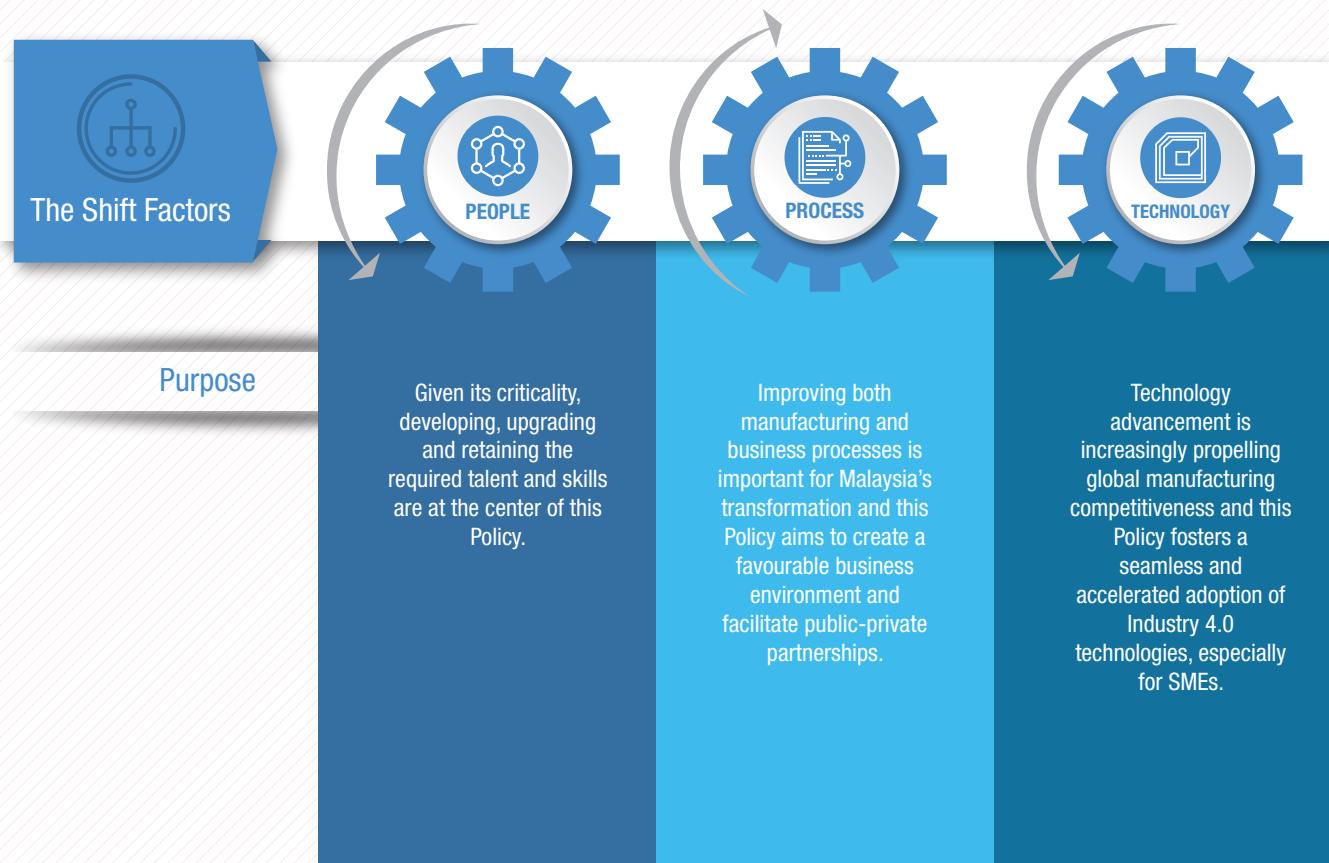
The development of these visions is made in full realisation that there is a need to transform the manufacturing industry to embrace Industry 4.0. This is due to the fact that global trends point towards the ability to master and adopt the new technology development which will then drive Malaysia towards greater competitiveness.



MOVING FORWARD

SHIFT FACTORS

Malaysia's transformation will require an approach and an ecosystem that optimise the relationships among people, process and technology. Industry 4.0 adoption will only be as good as the processes that are implemented around it, and the processes are only as good as the people who execute them.



To bring the shift factor gears together and achieve optimal results, a well-coordinated orchestration and top-level driven implementation will be important.



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MOVING FORWARD

NATIONAL GOALS & TARGETS

The specific goals and targets are in support of the national vision for the transformation of the manufacturing sector. They guide and measure Malaysia's progress in improving productivity, strengthening the innovation capacity and capability, driving the shift to a higher skilled workforce, and expanding the overall contribution of the manufacturing sector to the national economy.

To increase the level of productivity in the manufacturing sector

To elevate the contribution of the manufacturing sector to the economy

To strengthen our innovation capacity and capability, reflected in global innovation rankings

To increase the number of high-skilled workers in the manufacturing sector

The targets for 2025, developed from 2016 baseline figures:

Productivity of the manufacturing industry per person

From **RM106,647**
To increase by **30%**

Absolute contribution in Ringgit Malaysia (RM) term from the manufacturing sector to the national economy

From **RM254** billion
To **RM392** billion

Global Innovation Index ranking

From **#35**
To top **30** nations

Numbers of **high-skilled workers** in the manufacturing sector

From **18%**
to **35%**

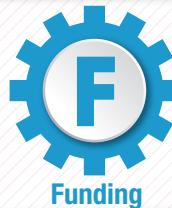


THE STRATEGIC ENABLERS

THE STRATEGIC ENABLERS EXPLAINED



The Strategic Enablers F.I.R.S.T



Funding & Outcome-based Incentives

The development and adoption of Industry 4.0 technologies and processes may require substantial investments by manufacturing firms. Questions will arise on what incentives and funding options are available by both Government agencies and private entities, especially for SMEs.

The funding strategies are aimed at encouraging companies to adopt new manufacturing technologies and processes and invest in R&D, specifically to develop local solutions targeted at Malaysia's needs and priorities. Special attention will be given to collaborative efforts in developing and deploying Industry 4.0 technologies.

To ensure progress and impact, the incentives will be linked to specific outcomes. These strategies are applicable to both manufacturing firms as the users and adopters, and to service providers of Industry 4.0 technologies and solutions.



Enabling Ecosystem & Efficient Digital Infrastructure

Fast and secure data connection is a basic requirement for the realisation of Industry 4.0. Good and reliable internet speed rate is needed for implementing internet-based production technologies or services, be it IoT solutions, use of augmented reality and wearables in production or the evaluation of real-time data. Although Malaysia has deployed High Speed Broadband and 4G technologies on a widespread basis, there are still some gaps in key industrial and training locations.

A digitalised and connected infrastructure across supply and manufacturing value chains is critical to foster a seamless movement of goods, data and services; drive efficiency and resource optimisation and support joint development efforts. Currently, a number of processes are still not digitalised across many ministries and Government agencies, ranging from various approvals, licensing, certification, to clearance of goods and other processes.

Service providers will play an essential role in helping Malaysian companies accelerate their transition to Industry 4.0, particularly in developing people, transforming processes and adopting technologies. As such, involving service providers and linking them to manufacturing firms, especially SMEs, is important to create a holistic and effective Industry 4.0 ecosystem.



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Regulatory Framework & Industry Adoption

Regulation is a key enabler of Malaysia's Industry 4.0 transformation. Special emphasis will need to be on increasing awareness of the need and benefits of adopting Industry 4.0 technologies and processes. This is particularly important for SMEs who still have a limited understanding of digital adoption and Industry 4.0 and often are concerned about the cost and level of change required.

Moreover, to foster an accelerated transformation, mechanisms will need to be put in place to help manufacturing firms understand their current capabilities and what it will take for them to transform and implement Industry 4.0 technologies and upgrade their processes and skills.

Data integrity, security and analysis are important areas of focus to ensure seamless data flow across value chains. This will also help the Government understand priority issues across initiatives, ministries and agencies in charting effective programmes and providing regulatory support.



Upskilling Existing & Producing Future Talents

Industry 4.0 is fundamentally reshaping the jobs landscape and will foster significant changes in how industrial workers perform their jobs. Entirely new jobs with very different skill requirements will be created, while some tasks will become obsolete. The shifting employment landscape has significant implications for industry, education systems and the Government.

A qualified and skilled workforce is indispensable for the introduction and adoption of Industry 4.0. The technical knowledge required is high, and will be primarily recruited from the STEM (science, technology, engineering and mathematics) subjects. However, for some years the number of STEM graduates has fallen below expectations.

There is an urgent need to create a skilled and diverse workforce, with high salary, both by upskilling the existing labour pool and by attracting and developing future talent in the manufacturing sector. Particular attention also needs to be given to reskilling and upskilling lesser-skilled workers to other sectors and activities.



Access to Smart Technologies & Standards

Understanding of and access to advanced, cost-effective and interoperable Industry 4.0 technologies are at the core of unlocking the potential of Industry 4.0. At present, the majority of Malaysian manufacturing firms surveyed adopt less than 50% automation.

The experiences from other countries demonstrate the importance of digital/technology labs and collaborative platforms, especially public-private partnerships (PPPs), in disseminating Industry 4.0 technologies and transferring knowledge. The Government aims to work with global and local industry leads to set up digital and Industry 4.0 demonstration labs.

Moreover, standards compliance that fosters interoperability of systems, both nationally and internationally, is important to support seamless value chains, optimise resources and improve productivity.

Finally, developing and commercialising new technologies and processes that address specific needs in priority sectors will be crucial to retain Malaysia's position as a preferred high-tech and manufacturing hub, and supply chain partner.

THE NATIONAL STRATEGIES



Attract



Create

2016

RM106,647

Labour Productivity

RM254b

Manufacturing Contribution

35

Ranking in Global Innovation Index

18%

High-skilled Workers in Manufacturing Sector



Funding

Funding & Outcome-based Incentives



Infrastructure

Enabling Ecosystem & Efficient Digital Infrastructure



Regulations

Regulatory Framework & Industry Adoption

Strategy F1:

Provide outcome-based incentives, including tax incentives to encourage investments in, and adoption of, Industry 4.0 technologies & processes

Strategy F2:

Introduce dynamic and innovative financial products to encourage the adoption of Industry 4.0 technologies & processes

Strategy I1:

Strengthen the digital connectivity in and between industrial, education and training hubs to remove connectivity bottlenecks in adopting Industry 4.0 technologies

Strategy I2:

Enhance the digitalisation and integration of Government processes and infrastructure along supply and manufacturing value chains

Strategy R1:

Increase awareness of the need, benefits and opportunities of Industry 4.0 technologies and business processes among manufacturing firms

Strategy R2:

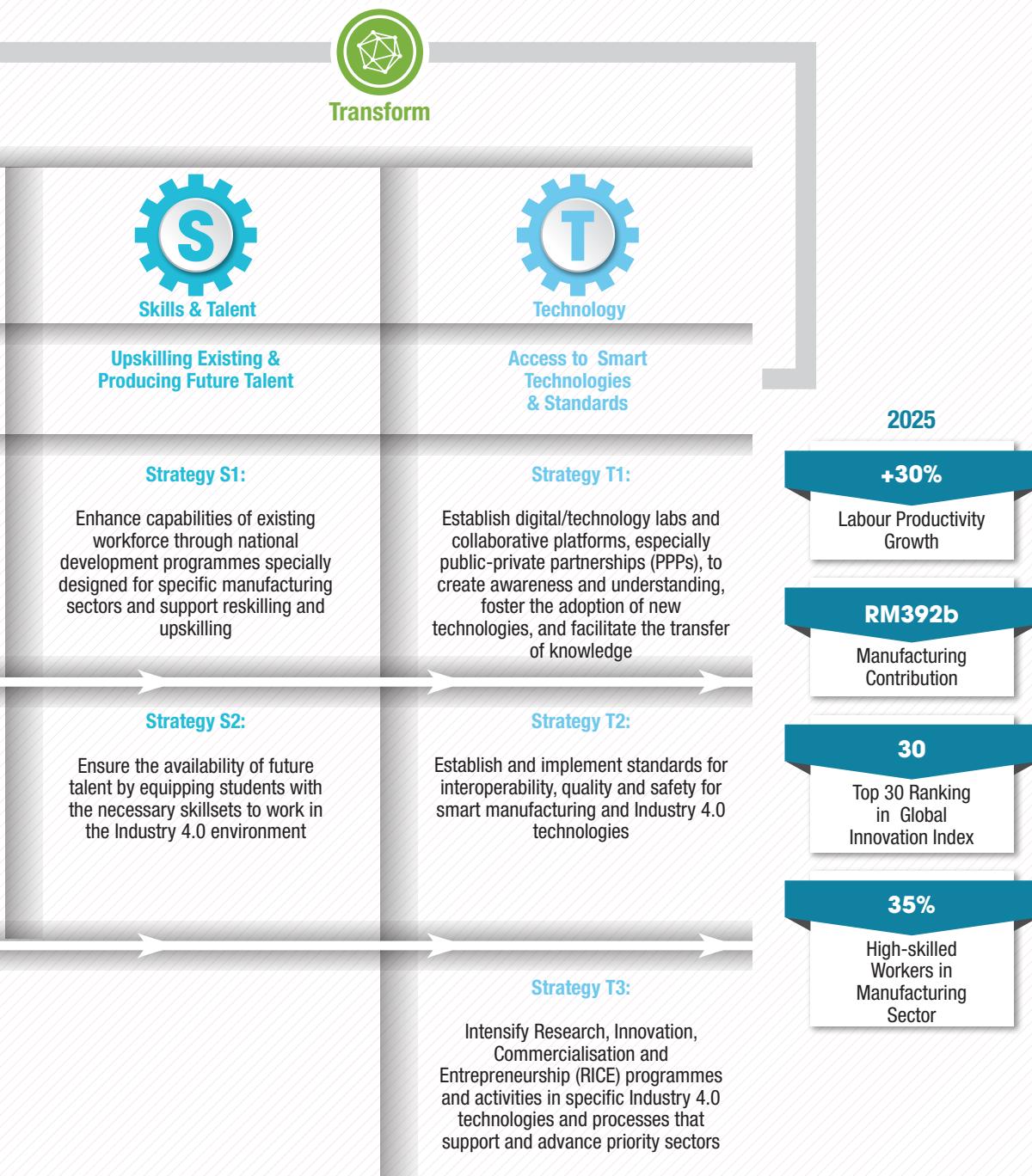
Create a platform and mechanism to help manufacturing and related services firms, especially SMEs, assess and develop their Industry 4.0 capabilities

Strategy I3:

Involve service providers for Industry 4.0 and link them to manufacturing firms to help implement technologies, processes and skills development

Strategy R3:

Improve data integrity, standards, sharing and security to facilitate seamless integration of manufacturing value chains and support intra-ministerial coordination for effective Industry 4.0 programmes



FUNDING & OUTCOME-BASED INCENTIVES



Provide outcome-based incentives, including tax incentives to encourage investments in, and adoption of, Industry 4.0 technologies & processes

RATIONALE

The Government aims to support industry transformation and develop local technologies by providing and aligning incentives with targeted outcomes to manufacturing firms and solution providers

STRATEGIC OUTCOMES

- ⚙️ Fiscal and non-fiscal incentives for local firms, SMEs and start-ups as well as multinational corporations (MNCs) that deploy or develop Industry 4.0 technologies and processes

ACTION PLANS/PROGRAMMES

- ⚙️ Explore the realigning and leveraging of incentive packages to encourage the adoption of Industry 4.0 among local firms, especially SMEs
- ⚙️ Explore the provision of incentive packages to MNCs partnering with local firms, especially SMEs, to expedite the adoption and implementation of Industry 4.0



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FUNDING & OUTCOME-BASED INCENTIVES



F2
STRATEGY

Introduce dynamic and innovative financial products to encourage the adoption of Industry 4.0 technologies & processes

RATIONALE

In fulfilling the needs of diverse and innovative businesses, the Government and private sector will spur the implementation of Industry 4.0 through dynamic and innovative funding options for local firms, SMEs and start-ups as well as MNCs

STRATEGIC OUTCOMES

- ➊ A suite of comprehensive financial products that local firms, SMEs and start-ups as well as MNCs can leverage on in line with their needs in implementing and adopting Industry 4.0 technologies and processes, across all stages of business lifecycle
- ➋ Development funds for adoption, development or deployment of Industry 4.0 technologies and processes

ACTION PLANS/PROGRAMMES

- ➊ Explore the creation of Government-led development funds for Industry 4.0
- ➋ Create an enabling ecosystem to encourage financial service providers to provide various financing options for Industry 4.0
- ➌ Explore and align new and existing alternative financing including venture capital, crowd funding and other intermediaries to expedite the adoption and implementation of Industry 4.0

ENABLING ECOSYSTEM & EFFICIENT DIGITAL INFRASTRUCTURE



Strengthen the digital connectivity in and between industrial, education and training hubs to remove connectivity bottlenecks in adopting Industry 4.0 technologies

RATIONALE

Fast and secure data connection is a basic requirement for the realisation of Industry 4.0 technologies and services. Malaysia has already deployed High Speed Broadband (HSBB) and 4G technologies on a widespread basis. However, there are still some gaps in key industrial and training locations that could impact the adoption and development of Industry 4.0 technologies and processes.

This strategy aims to systematically address and remove key connectivity bottlenecks in priority locations.

STRATEGIC OUTCOMES

- ➊ High speed, reliable and affordable connectivity for industrial, education and training hubs
- ➋ Adoption of digital and Industry 4.0 technologies and processes among manufacturing firms and related services providers

ACTION PLANS/PROGRAMMES

- ➊ Prioritise and expedite the implementation of HSBB at key industrial areas and training centres
- ➋ Encourage the deployment of converged networks that are essential for Industry 4.0 technologies



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TRANSFORM

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ENABLING ECOSYSTEM & EFFICIENT DIGITAL INFRASTRUCTURE



Enhance the digitalisation and integration of Government processes and infrastructure along supply and manufacturing value chains

RATIONALE

Digitalising and integrating Government processes and infrastructure elements along value chains will be key to enable secure data flow, assure seamless movement of goods, and drive improvements in efficiency and productivity. A number of Government processes are not yet digitalised and will need to be optimised, digitalised and integrated to support Malaysia's Industry 4.0 transformation. These include certain approvals, licensing, certification, clearance of goods and other processes.

STRATEGIC OUTCOMES

- ⚙️ End-to-end digitalisation of Government processes along the manufacturing and supply value chains
- ⚙️ Seamless movement of goods and services among manufacturers, suppliers and supporting agencies with improved visibility and optimised resourcing

ACTION PLANS/PROGRAMMES

- ⚙️ Assess priority Government-related processes and elements that impact manufacturing and supply chains and Industry 4.0 transformation
- ⚙️ Support the accelerated digitalisation and integration of these processes, led by the respective Government agencies

ENABLING ECOSYSTEM & EFFICIENT DIGITAL INFRASTRUCTURE



Involve service providers for Industry 4.0 and link them to manufacturing firms to help implement technologies, processes and skills development

RATIONALE

Services related to Industry 4.0 are important to help Malaysian companies accelerate their transition, especially in developing people, transforming processes and adopting technologies. Hence, Industry 4.0 service providers need to be involved as an integral part of the ecosystem and be connected to manufacturing firms, especially SMEs, who often have limited visibility.

STRATEGIC OUTCOMES

- ➊ End-to-end ecosystem support and service provider visibility for manufacturing firms
- ➋ Improved performance of service providers in helping manufacturing firms adopt and transform to Industry 4.0

ACTION PLANS/PROGRAMMES

- ➊ Develop and disseminate a catalogue of service providers
- ➋ Link service providers to manufacturing firms and SMEs through collaborative platforms
- ➌ Support digital adoption within the manufacturing value chain with a structured approach and measurable outcomes



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TRANSFORM

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REGULATORY FRAMEWORK & INDUSTRY ADOPTION



Increase awareness of the need, benefits and opportunities of Industry 4.0 technologies and business processes among manufacturing firms

RATIONALE

Lack of awareness in digitalisation and Industry 4.0 is one of the main barriers to embark on smart manufacturing transformation.

A greater understanding of Industry 4.0 is crucial for manufacturing firms to make informed decisions on investments, especially on assessing impact, determining costs and benefits of automation, and capitalising on data.

Structured awareness programmes are needed to educate and promote the understanding and need for action to local firms, particularly SMEs.

STRATEGIC OUTCOMES

- ➊ Increased understanding of the need, benefits and opportunities of Industry 4.0
- ➋ More manufacturing firms adopting Industry 4.0 technologies and processes

ACTION PLANS/PROGRAMMES

- ➊ Undertake a comprehensive Industry 4.0 awareness program across all stakeholders with particular focus on SMEs
- ➋ Create a regulatory sandbox that enables firms to manage regulatory risks during testing stage



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CREATE



TRANSFORM

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REGULATORY FRAMEWORK & INDUSTRY ADOPTION



Create a platform and mechanism to help manufacturing and related services firms, especially SMEs, assess and develop their Industry 4.0 capabilities

RATIONALE

For many companies, Industry 4.0 will be a major transformation, not only in terms of investment in technologies but also changes in business processes and culture.

The experiences of other countries show that assessment tools and platforms for learning and sharing of best practices help companies, especially SMEs, pinpoint priorities of what to address and how to transform.

Implementing this strategy will require a close collaboration with different industry associations to ensure focus on the priorities. This strategy will also help the Government better assess the broader needs, challenges and priorities of Malaysian manufacturing firms.

STRATEGIC OUTCOMES

- ➊ Better understanding of best practices, own capabilities and transformation requirements by manufacturing firms
- ➋ Profile of the state of readiness of local manufacturing industry in adopting Industry 4.0 for targeted technological improvement and support prioritisation

ACTION PLANS/PROGRAMMES

- ➊ Create tools and processes to help manufacturing and related services firms, assess their capabilities and readiness to adopt Industry 4.0 technologies and processes
- ➋ Establish a national Readiness Assessment Programme as a tool for conducting assessment, sharing global and local best practices, supporting the development of local firms and identifying national Industry 4.0 priorities
- ➌ Establish collaborative programmes with other countries that are leading in the Industry 4.0 transformation to share best practices and help guide Malaysia's programmes for optimal impact

REGULATORY FRAMEWORK & INDUSTRY ADOPTION



Improve data integrity, standards, sharing and security to facilitate seamless integration of manufacturing value chains and to support intra-ministerial coordination for effective Industry 4.0 programmes

RATIONALE

A significant barrier to enable seamless digital flow along manufacturing and supply chains is the lack of standards, interoperability and governance for both data and intellectual properties.

Issues with data integrity and interoperability can also affect intra-ministerial and industry coordination and effective analysis in identifying programme and regulatory priorities.

This will require both the development of standards and security protocols and integration especially across ministries and agencies.

This strategy supports strategy I2, the digitalisation and integration of Government processes into manufacturing supply chains.

STRATEGIC OUTCOMES

- Integrated, standardised, secure and trusted data ecosystem that enables seamless data flow throughout major manufacturing and supply chains
- Better understanding and analysis of priority issues across initiatives, ministries and agencies, driving more effective programmes and regulatory support

ACTION PLANS/PROGRAMMES

- Identify and implement effective, streamlined and standardised data, laws, regulations and compliance protocols within and between ministries and agencies
- Collaborate with businesses to ensure suitable standards are in place for data privacy, including appropriate handling, ownership and storage
- Create a manufacturing industry data depository that will enable sharing and analyses across all ministries and agencies
- Establish a set of cybersecurity and IoT security guidelines for Industry 4.0 as part of Malaysia's broader development of cybersecurity capabilities



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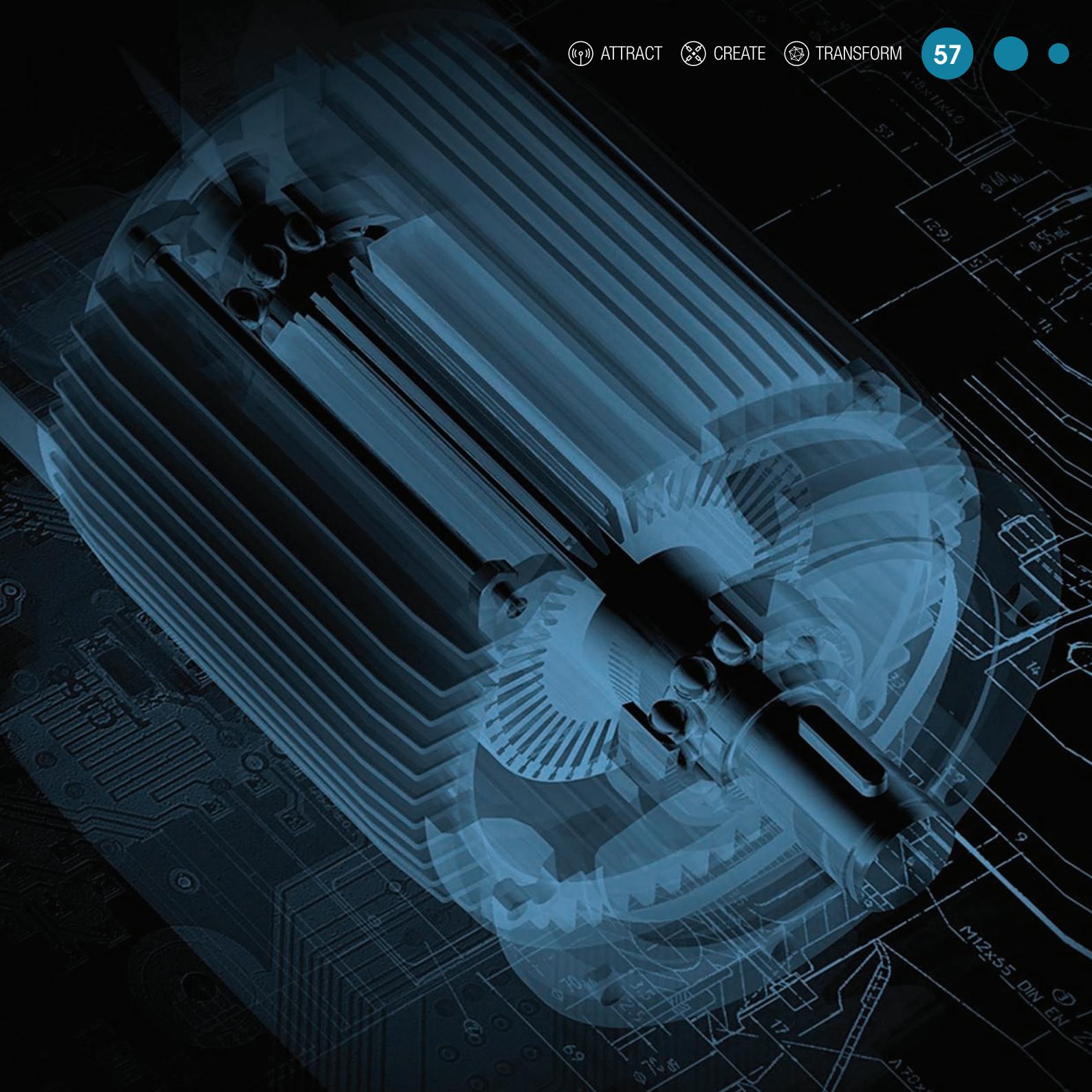


CREATE



TRANSFORM

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UPSKILLING EXISTING & PRODUCING FUTURE TALENT



Enhance the capabilities of the existing workforce through national development programmes specially designed for specific manufacturing sectors and support reskilling and upskilling

RATIONALE

The transition to smart manufacturing business models, technologies and processes is rapidly changing the required skill sets for the existing workforce. Many firms, especially SMEs, will require more structured and up-to-date training and skills development avenues for developing and maintaining world-class practices and capabilities within their workforce, including experts with advanced Industry 4.0 knowledge.

This strategy aims to both upskill the existing workforce and mitigate the potential impact on jobs.

STRATEGIC OUTCOMES

- Increase in overall labour productivity due to upskilling and reskilling of the existing workforce
- Increase in number of high-skilled and multi-skilled workers with high wages in the manufacturing industry, particularly in high value-added activities
- Mitigation of potential job losses as a result of automation and technology adoption

ACTION PLANS/PROGRAMMES

- Create an Industry 4.0 Talent Competency & Technology Mentoring programmes to drive broader workforce development initiatives in line with specific sector requirements
- Establish Skills Certification programmes in Industry 4.0 areas
- Develop tailored training courses for the reskilling of transitioning employees
- Enhance classroom modules for intensive upskilling programmes by using augmented or virtual reality (AR/VR)
- Enable the availability of data on Industry 4.0 talent and labour pools for the Government, academia and industry (in order to chart future action plans)



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UPSKILLING EXISTING & PRODUCING FUTURE TALENT



S2
STRATEGY

Ensure the availability of future talent by equipping students with the necessary skillsets to work in the Industry 4.0 environment

RATIONALE

Ensuring the pipeline of future talent in the manufacturing sector is important as advances in manufacturing techniques and processes require a higher skilled and more educated workforce. The focus on technical and vocational education and training (TVET), and science, technology, engineering and mathematics (STEM) education will be of priority to ensure a continuous supply of highly qualified talent.

Structured industrial training programmes between industry and academia are able to close the gap between classroom modules and skills required in the working environment. There is also a need to raise the profile of high-tech manufacturing industry as an attractive workplace and career option. This will be key to attracting more students to STEM subjects.

STRATEGIC OUTCOMES

- Continuous availability of Industry 4.0 talent for the manufacturing industry
- Graduates equipped with relevant and practical Industry 4.0 skills
- Increased number of TVET and STEM students
- Increased industry-academia collaboration

ACTION PLANS/PROGRAMMES

- Boost support for TVET and STEM education programmes, in part by increasing funding for vocational education and training programmes
- Integrate theory and practical Industry 4.0 applications into tertiary education curricula, including structuring industry placement opportunities
- Promote manufacturing as a preferred option for high-skilled jobs to overcome public perception and attract both skilled labour and university graduates
- Enhance and increase the capacity and capability of educators, trainers and instructors in the manufacturing-related education sectors

ACCESS TO SMART TECHNOLOGIES & STANDARDS



Establish digital/technology labs and collaborative platforms, especially public-private partnerships (PPPs), to create awareness and understanding, foster the adoption of new technologies, and facilitate the transfer of knowledge

RATIONALE

Digital and technology labs by manufacturing leaders create showcase for local companies, especially SMEs, to understand available and best-in-class technologies and practical use cases, and engage in collaborative deployment efforts.

PPPs is a proven concept to help expedite the adoption of new technologies in priority areas. The Government intends to work with local and global leaders to establish more digital and technology labs and collaborative platforms through PPPs.

STRATEGIC OUTCOMES

- ➊ Access for local companies, especially SMEs, to key enabling Industry 4.0 technologies and partners
- ➋ Stronger collaboration in deploying new technologies across value chains
- ➌ PPPs for industry, academia, Government and other stakeholders to work for a targeted outcome in Industry 4.0

ACTION PLANS/PROGRAMMES

- ➊ Support leading global and local industry leaders to establish digital and technology labs that showcase the potential applications, benefits and proof of concept of new technologies for industry adoption
- ➋ Create PPPs and collaborative programmes for manufacturing activities that foster digital adoption, collaborative deployment and development of local capabilities, especially in priority sectors and technologies
- ➌ Provide local firms, especially SMEs, with open access to smart manufacturing research, tools and technologies and help them understand what can be applied in the early stages of adoption

ACCESS TO SMART TECHNOLOGIES & STANDARDS



**T2
STRATEGY**

Establish and implement standards for interoperability, quality and safety for smart manufacturing and Industry 4.0 technologies

RATIONALE

Standards and interoperability of systems are important to facilitate extensive adoption of Industry 4.0 technologies and processes, given the need for collaboration and integration along manufacturing and supply chains. These standards need to be clear, well documented and accessible, and allow Malaysian-based manufacturing firms to integrate both within local and global production networks and supply chains.

STRATEGIC OUTCOMES

- Standardisation for interoperability of Industry 4.0 technologies and processes
- Seamless integration and interoperability in local and global manufacturing and supply value chains

ACTION PLANS/PROGRAMMES

- Establish an inventory of, and develop Industry 4.0-related standards – consolidate, harmonise and align with global standards
- Address interoperability barriers by implementing appropriate and advanced industry standards, in close consultation with the industry

ACCESS TO SMART TECHNOLOGIES & STANDARDS



Intensify Research, Innovation, Commercialisation and Entrepreneurship (RICE) programs and activities in specific Industry 4.0 technologies and processes that support and advance priority sectors

RATIONALE

Growth opportunities in the manufacturing sector will need to be supported by technological innovation from both private and public research communities. Sustained growth in the manufacturing sector will require proactive investments in advancing and enabling Industry 4.0 technologies and processes.

A further step up in Malaysia's innovation capabilities will be important to propel priority sectors and technologies and reinforce Malaysia's position as preferred high-tech manufacturing destination.

STRATEGIC OUTCOMES

- ➊ Increase in capacity and capability of Malaysian firms, start-ups, universities and research institutes in Industry 4.0 technologies
- ➋ Production and commercialisation of high value and innovative products and services
- ➌ Position as primary destination for high-tech industry

ACTION PLANS/PROGRAMMES

- ➊ Prioritise technology development programmes on Industry 4.0 that strengthen the overall research, innovation, commercialisation and entrepreneurship (RICE) capacity and provide solutions for priority sectors
- ➋ Improve understanding by, and access for, manufacturing firms of existing Industry 4.0 research facilities and ongoing R&D
- ➌ Create technology development and experimentation labs for collaborative Industry 4.0 technology and solutions development



ATTRACT



CREATE



TRANSFORM

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IMPLEMENTATION APPROACH



The strategies and action plans outlined in this Policy require collaborative efforts across multiple stakeholders and organisations. To accelerate or improve the intended outcome of these actions, a number of factors must be taken into consideration to identify the most efficient and effective implementation approach. This includes but not limited to:

Multi-ministries jurisdictions

The strategies and action plans in this Policy form a systemic solution for the manufacturing industry and its related services.



Not a one-stop solution

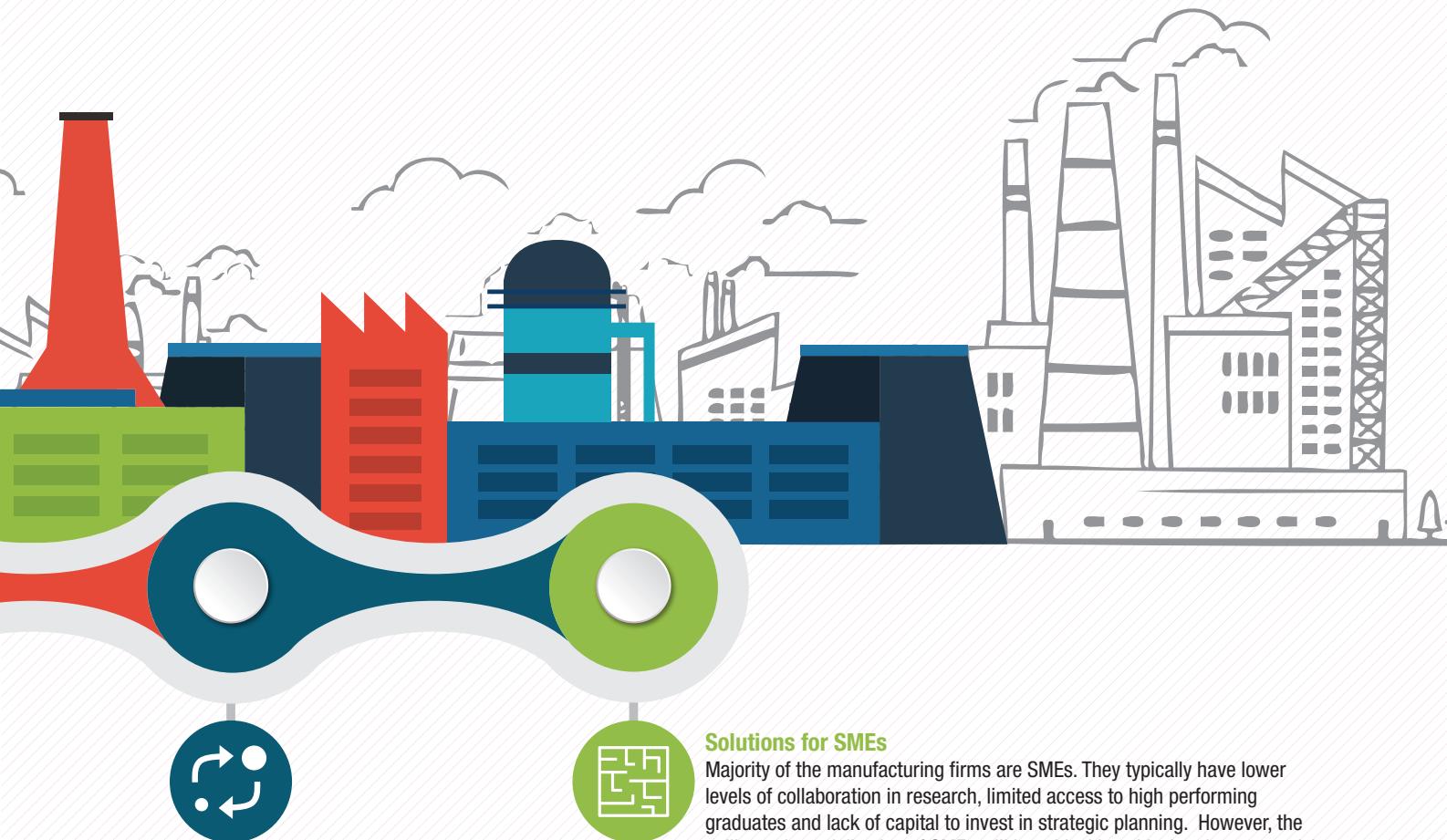
Although efforts have been taken to incorporate all possible interventions, this Policy is not a solution to all.



One size fits all – breadth and depth

This Policy provides broad strategies and action plans. It is premised upon the principle that each sector within the manufacturing industry has different levels of readiness in embracing and adopting Industry 4.0. Further work is required to customise these recommendations for each sector depending on their needs and priorities.





Differentiating circumstances

In recognising the best practices among manufacturing ecosystems such as Germany and Japan, it is acknowledged that the needs and the driving factors of these countries are very much different from Malaysia's. An exact replication of their successful systems would not work well in Malaysia's context due to these differences. As such, each manufacturing sub-sector needs to consider which elements of these international benchmarks could be adopted.

Solutions for SMEs

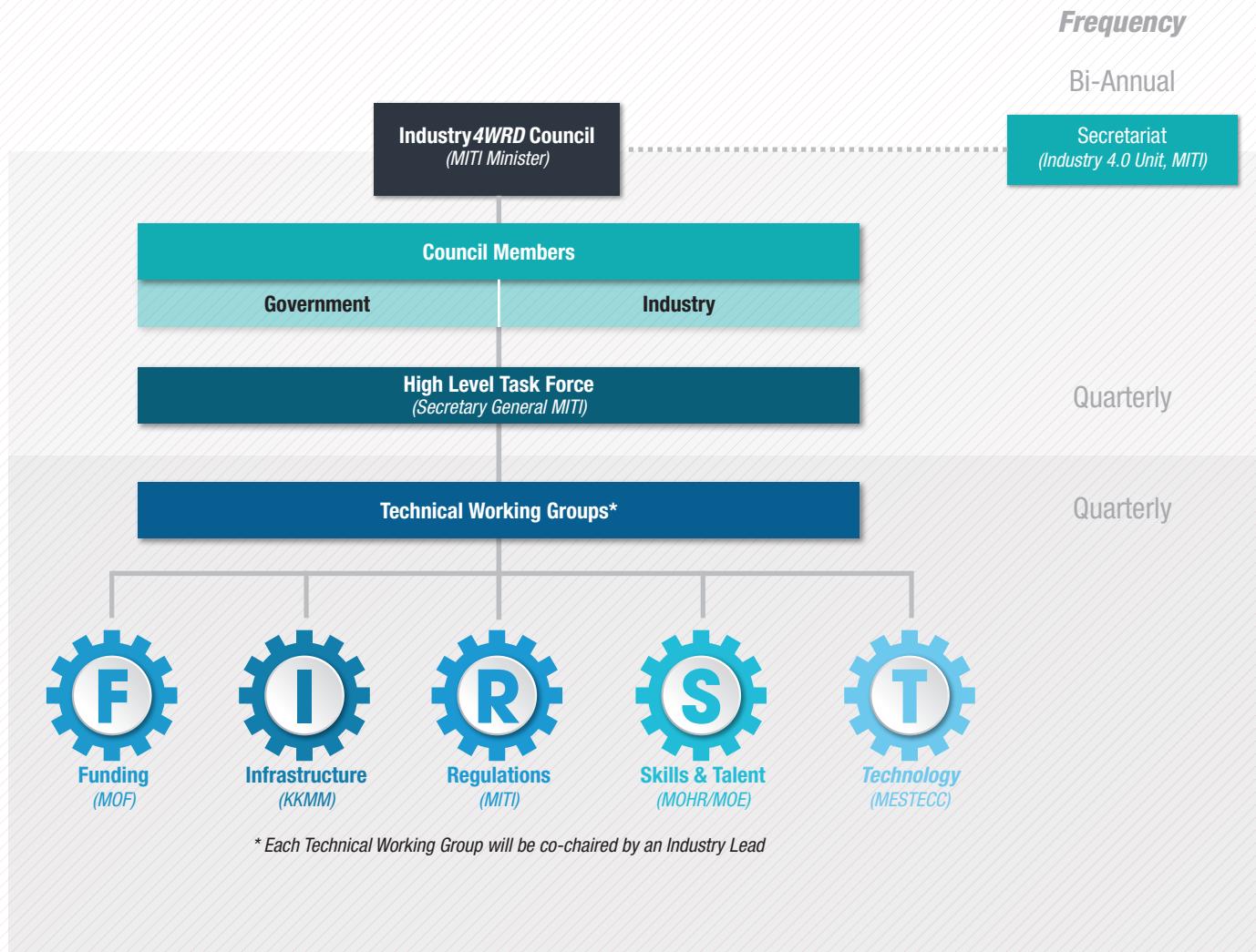
Majority of the manufacturing firms are SMEs. They typically have lower levels of collaboration in research, limited access to high performing graduates and lack of capital to invest in strategic planning. However, the agility and specialisation of SMEs will be critical in achieving the 8-year vision for the manufacturing sector. In implementing the suggested actions, it is important to ensure solutions are accessible and effective for SMEs, and that the research community and larger businesses are more incentivised to collaborate with SMEs.

Transforming Malaysian manufacturing sector is not a short-term process, where many industries having experienced significant challenges for decades. A supportive policy environment is required over the next decade to provide businesses with stability and allow them to execute these long-term strategies.

MOVING FORWARD

GOVERNANCE & OVERSIGHT

Propelling Malaysia's Industry 4.0 transformation will require a concerted effort across many ministries and agencies, industry, research facilities and academic institutes. MITI will oversee and manage the Malaysia Industry4WRD Council, chaired by the Minister of International Trade and Industry, and work with various working groups to coordinate all stakeholder activities and drive progress.







Attract



Create



Funding



Infrastructure



Regulations

Funding & Outcome-based Incentives

Enabling Ecosystem & Efficient Digital Infrastructure

Regulatory Framework & Industry Adoption

Strategy F1:



MINISTRY OF FINANCE



MINISTRY OF INTERNATIONAL TRADE AND INDUSTRY

Strategy I1:



MINISTRY OF COMMUNICATIONS AND MULTIMEDIA MALAYSIA

Strategy R1:



MINISTRY OF INTERNATIONAL TRADE AND INDUSTRY

Strategy F2:

ECONOMIC PLANNING UNIT,
MINISTRY OF
ECONOMIC AFFAIRSBANK NEGARA MALAYSIA
CENTRAL BANK OF MALAYSIASuruhanjaya Sekuriti
Securities Commission
Malaysia

Strategy I2:

MINISTRY OF INTERNATIONAL
TRADE AND INDUSTRY

Strategy R2:

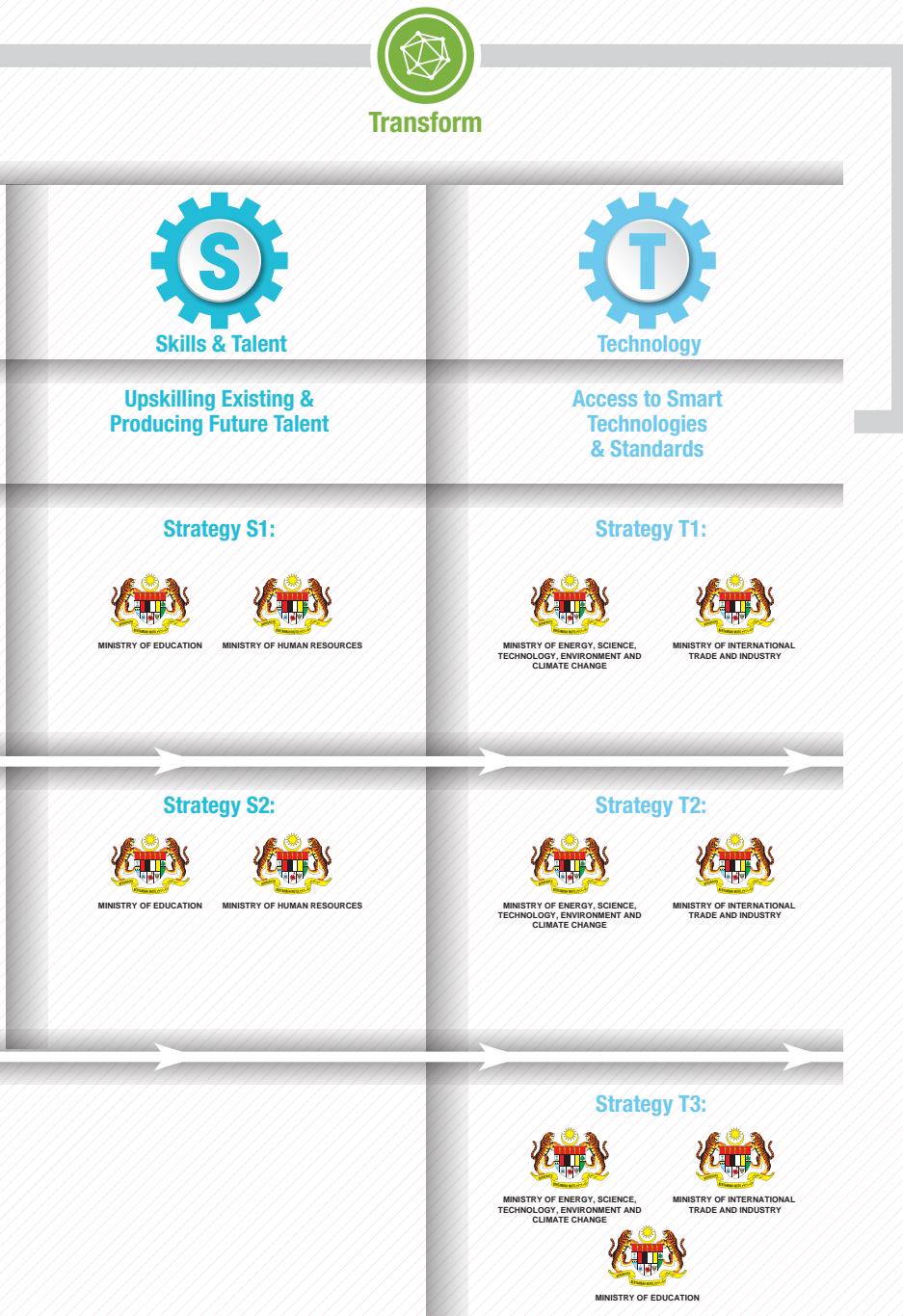
MINISTRY OF INTERNATIONAL
TRADE AND INDUSTRY

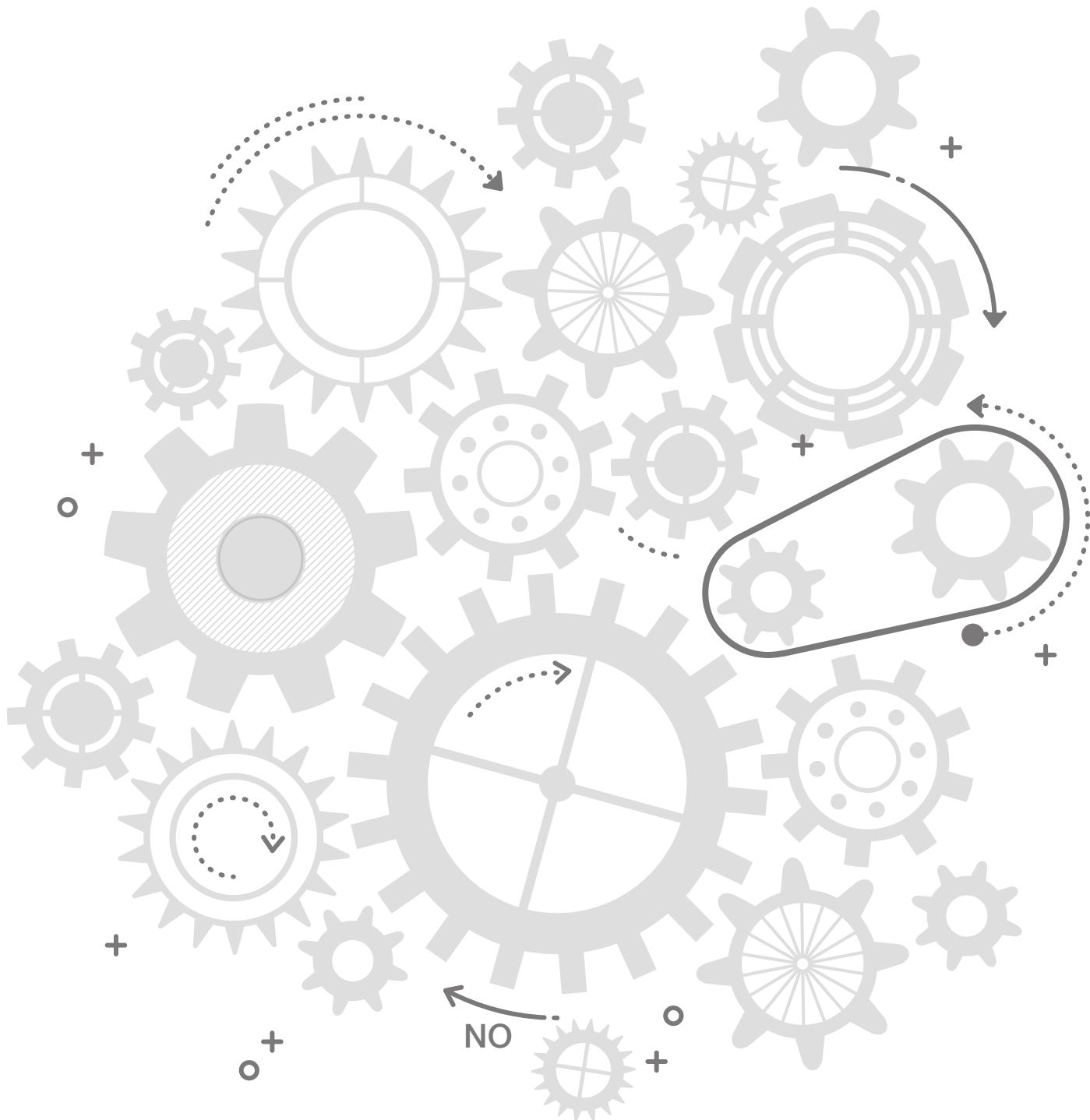
Strategy I3:

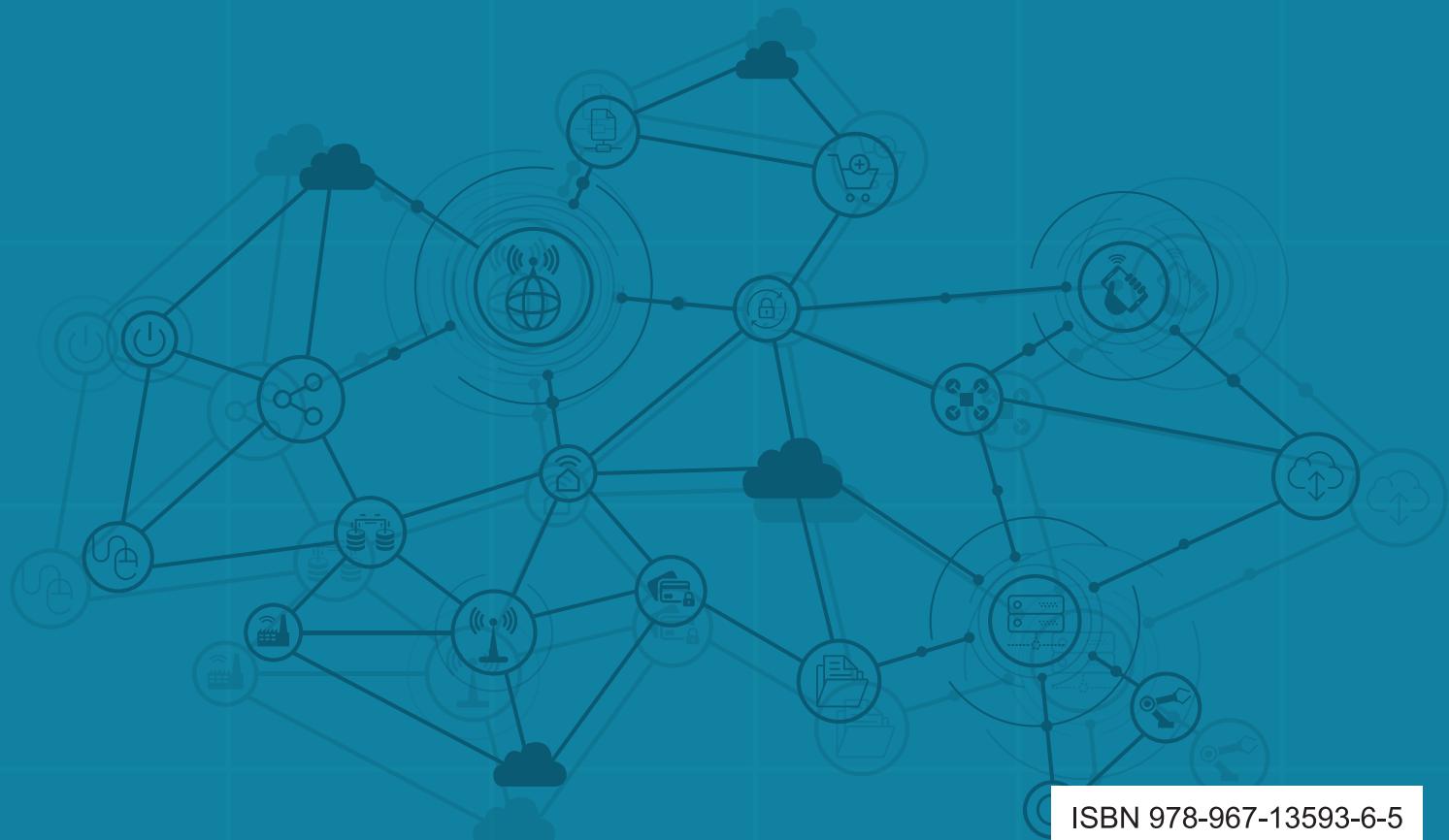
MINISTRY OF INTERNATIONAL
TRADE AND INDUSTRY

Strategy R3:

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ISBN 978-967-13593-6-5



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