International Journal of Management and Commerce Innovations ISSN 2348-7585 (Online)
Vol. 6, Issue 2, pp: (161-166), Month: October 2018 - March 2019, Available at: www.researchpublish.com

Fostering Manufacturing Sector through Human Capital Development in Malaysia

Kiran J.K.[1], S. Kaljeet [2]

[1,2]Malaysian Green Technology Corporation, 43600 Bandar Baru Bangi, Selangor, Malaysia

Abstract: **Malaysia is blessed with abundant resources. The rapid development of the country since independence was mainly supported by the use of natural resources. Over the past six decades, Malaysia has evolved from a primary economy dependent on mining, rubber and oil palm plantation, to manufacturing-based secondary economy, morphing into a service-based tertiary economy. Natural resources have served the nation well as the growth engine. For the benefits of the existing, as well as the future generations, it is crucial for the country to embark on green growth. To support this development strategy, green technology has been identified to catalyse sustainable economic growth. Green technology is cross-sectoral in nature, which presents a solution in balancing the needs for economic development and our responsibility towards the environment. The production and development of green technology offer the opportunity to stimulate economic activities in various sectors, creating jobs and attracting investment. Green technology also offers the capability of mitigating negative environment impact resulting from economic activities and the application provides the solution to realise the country's commitment to the world. There is a growing global need to deal with dangers of climate change, in part through the implementation of green technology.**

Keywords: **National Green Technology Policy Green Technology Master Plan Manufacturing Sector Green Technology Human Capital Development.**

I. INTRODUCTION

As Malaysia transforms into a high-income nation, the national development strategy must be in line with the megatrends of the world, especially climate change. As a signatory nation to the Conference of Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC), Malaysia has pledged to reduce its Greenhouse Gas (GHG) emission intensity of Gross Domestic Product (GDP) by up to 45% by 2030 relative to 2005 levels. This consists of 35% on an unconditional basis and a further 10% is conditional upon receipt of climate finance, technology transfer and capacity building from developed countries.

The Sustainable Development Goals (SDGs) represent universal call to act to end poverty, protect the planet and ensure that all people enjoy peace and prosperity. There are 17 SDGs which were built on the successes of the Millennium Development Goals, including new areas such as climate change, economic inequality, innovation and sustainable consumption. The goals are interconnected – often the key to success on one will involve tackling issues more commonly associated with another. The SDGs work in the spirit of partnership and pragmatism to make the right choices now to improve life, in a sustainable way, for future generations. The SDGs provide clear guidelines and targets for all countries to adopt in accordance with their own priorities and the environmental challenges of the world at large. Green technology plays a vital role towards achieving the extensive goals and indicators of SDGs namely Goal 6 (clean water and sanitation), Goal 7 (affordable and clean energy), Goal 11 (sustainable city and communities), Goal 12 (responsible consumption and production) and Goal 13 (climate action).

The Green Technology Master Plan (GTMP) outlines the strategic plans for green technology development to create a low-carbon and resource efficient economy. This document sets out the immediate course for the country to embark on a green growth journey. It lays the foundation for the cultivation of mindset and behavioural change, to inculcate green lifestyle among the citizen.

A. Green Technology Master Plan

The GTMP outlines the action plans for green technology development to create a low-carbon and resource efficient economy, focuses on six key sectors, namely Energy, Manufacturing, Transportation, Building, Waste and Water. In realising the action plans for each topical area, the GTMP will draw on the five strategies thrusts as outlined in the National Green Technology Policy (Table I).

TABLE I: STRATEGIES THRUSTS IN NATIONAL GREEN TECHNOLOGY POLICY

No	Strategies Thrusts
1	Strengthen the institutional framework
2	Provide a conducive environment for green technology development
3	Intensify human capital development in green technology
4	Intensify green technology research and innovations
5	Promotion and public awareness

B. Manufacturing Sector

Malaysia's manufacturing sector is dominated by the small and medium-sized enterprises (SMEs), making up 95% of the sector, with the remaining 5% comprised of the large enterprises. The government has to ensure the growth of manufacturing sectors by promoting relevant policies and regulation while ensuring sustainability and safety of the environment. (H'ng *et. al.*, 2015). Initiatives have been put into place to green the industry, with measures promoting energy efficiency and adopting of 'greener' manufacturing processes that reduce water and raw material consumption while minimising air pollution, solid waste and wastewater generation. Challenges highlighted were pegged on the fact that the manufacturing sector covers a diverse range of industrial segments, each with its own unique environmental issues and circumstances requiring tailored solutions. Recommendations include scaling up towards a circular economy, where the industrial system would be more restorative or regenerative and improves resource performance and material savings.

The manufacturing sector is a major growth driver of Malaysia's economy. In RMK-11, the manufacturing sector is expected to grow at 5.1% per annum, contributing 22.1% to GDP and 18.2% of the total employment by 2020. It contributed about RM232.9 billion or 23% of GDP in 2014, making it the second largest contributor after the services sector. The growth of the sector was contributed largely by the electrical and electronic (E&E) and chemical sub-sectors. The E&E sub-sector contributed an increase from RM44.2 billion in 2011 to RM53.8 billion in 2015 via new application for semi-conductors.

Current Landscape

According to the 2011 Economic census, there were 645,136 SMEs, representing 97.3% of total business establishments. Out of these, 90.1% of SMEs are in the services sector, with 5.9% in manufacturing, 3% in construction and the rest in agriculture, mining and quarrying.

The manufacturing sector is dominated by SMEs representing 95% of all establishments while large enterprises constitute the remining 5%. As of 2015, there are approximately 3,400 green manufacturing SMEs in Malaysia. Collectively, the government aspires to double the numbers of green manufacturing SMEs by 2030.

Green manufacturing based on green energy utilisation is already widespread. More than 1000 Energy Managers have been certified under the ASEAN Energy Management Scheme (AEMAS) in the last 5 years which also qualify them to register under the Registered Electrical Energy Manager (REEM) administered by Energy Commission (ST). (Malaysian Green Technology Corporation)

Anticipating the growth of the manufacturing sector, the country's environmental concern in manufacturing needs to be mitigated via efficient use of energy and resources as well as minimizing generation of waste. This mitigation measures from the core initiatives of the 'Green Manufacturing' concept. A report on Green Manufacturing by the Boston Consulting Group in 2011 identifies transformation towards green manufacturing entails the executions of the following initiatives (Table II):

TABLE II: GREEN MANUFACTURING INITIATIVES

No	Initiatives	
1.	Utilization of green energy	Green energy involves production of cleaner energy. Green energy includes both deploying of renewable energy sources and achieving higher energy efficiency in operations.
2.	Developing and production of green products	Developing greener products with lower carbon footprint can often mean higher costs. However, by developing Green products with eco-labels that are sought by consumers, companies can derive additional volumes and price premiums.
3.	Deployment of green processes in manufacturing activity	Implementing green processes in operations entails efficient use of key resource, reduce waste generation, reducing carbon and water footprint. Green processes therefore improve operational efficiency and lower costs

It should be noted that Green Technology (GT) is the common denominator across all the above three areas of green energy, green products and green processes. Manufacturers can adopt green technologies in their business strategy in two different ways – building a new green business and using technology to "green" an existing one. Energy intensive manufacturing industries can embark on alternative technology that is more energy efficient such as cogeneration to help reduce their energy intensity.

Companies adopting green manufacturing benefited through long term cost savings, brand enhancement with customers and higher investor interest. However, these benefits require a long-term commitment and making trade-offs against short term objectives. Therefore, successful implementation requires adoption of an integrated framework comprising of planning for green as a core part of business strategy, executing green initiatives across the value chain by shifting towards green energy, green products and green processes and communicating and promoting green initiatives and their benefits to all stakeholders.

II. ISSUE AND CHALLENGES

Overall the adoption of green manufacturing practices is still very low in the manufacturing sector. Green manufacturing initiatives have been launched for the manufacturing sector as highlighted earlier. However, there is a need to further increase awareness to manufacturers in terms of the importance and benefits arising from the green initiatives. For example, increasing consumer concerns for sustainability and the depletion of natural resources such as oil are the top issues for the automotive industry. In comparison, water shortage, population growth and environmental pollution can be a top issue for the food production industry. This means that manufacturing companies need to first understand the concerns of their respective industries and then develop specific green strategies to address them in their respective industries.

Therefore, adopting of green manufacturing requires Malaysian manufacturers to embark on a transition from:

- Approaching green as limited, often isolated initiative with narrow focus to a more holistic approach,
- Meeting regulatory compliance to developing eco-advantage and
- Viewing initiatives as cost centres to assessing them as business opportunities.

To assist green manufacturing transformation, Malaysian manufactures need assistance to address the following impediments:

- Manufacturers need to fully understand drivers and issues relevant to them and their industries and what sustainability means to their business.
- Manufacturers face difficulties in modelling the business case or even finding a compelling case for sustainability.

- Manufacturers need to adopt green initiatives into their core business and integrated as corporate strategy in order to realise its full benefits.

Existing Initiatives

Various initiatives have been implemented in the manufacturing sector to aid green manufacturing adoption. These initiatives can be classified based on the green manufacturing initiative classification as follows:

Green Energy

- Efficient Management of Energy Efficiency Regulation 2008 (EMEER)
- Industrial Energy Efficiency for Malaysian Manufacturing Sector (IEEMS)
- Energy Audit Grant for Industrial sector (Energy Efficiency program under 11th Malaysia Plan)

Energy Management Gold Standard (EMGS)

- ASEAN Energy Management Scheme (AEMAS)

Green Products

- Environmental Declaration Scheme for Construction and Building Materials
- Malaysian Energy Efficiency and Solar Thermal Application (MAEESTA) Project
- My Hijau SME & Entrepreneur Development Programme and other green certification schemes.

Green Processes

- ISO 14001 Certification

As mentioned in the GTMP, one of the key initiatives to be taken is thru Human Capital Development. Human capital development will be done in partnership with industry. This would include exploring new delivery systems of learning and skills training, where engaging instructors and delivering materials can shift beyond classrooms and timetables, where learning becomes on-demand.

Training related to Energy Management for Industrial Sector

ASEAN Energy Manager Accreditation Scheme (AEMAS) training course

The AEMAS training course is one of the initiatives under human resource development programme to build capacity on energy management. This training course is recognised by Energy Commission to produce REEM. Energy managers are in demand due to the requirement of EMEER 2008 in which high electrical energy users need to engage energy managers to develop and monitor an EE management plan for the facility.

The AEMAS training aims to provide knowledge and skills to implement the Sustainable Energy Management System that complies to the requirements of ISO 50001 to all energy managers and produce certified energy mangers. To date, more than 1,000 CEMs have been certified under AEMAS (Malaysian Green Technology Corporation).

Certified Professional in Measurement and Verification (CPMV) training course

CPMV is another training programme to certify practitioners on measurement and verification (M&V) competency skill. M&V certification course aimed at endorsing end-users and energy service companies conducting measurement and verification activities for energy-saving programs.

Energy Auditor Training Course (EATC)

EATC covers the basic knowledge and skills required to perform energy checks, surveys and analyzes for energy conservation and to provide a structure to energy auditing practices and to raise professional standards for those involved in energy auditing.

Awareness Training

Awareness programs such as Have We Done Enough to Save Energy Bills? and the Basic Training Program for Energy and Water Management is also implemented.

Way Forward

With increasing global focus on GT, manufacturers should aim for adoption of green manufacturing best practices and technologies. The critical need is to create widespread awareness and adoption of Green Manufacturing practices amongst key growth industries. Incentives, regulatory enforcements and strong political will are essential for success and would be developed according to the green manufacturing initiatives (Table II).

A life-cycle approach will integrate pre-production, production and disposal phases in the product life-cycle. To succeed in Green Manufacturing, Malaysia manufacturers need assistance to address the following decision-making impediments:

- Lack of understanding on the environmental drivers and issues relevant to their industries and what sustainability means to their business.
- Difficulties in modelling the business case for sustainability.
- Lack of awareness on the implication of adopting green initiatives into their core business and integrating a corporate strategy in order to realize its full benefits.

Creating widespread awareness on green manufacturing also requires manufacturers to be made aware of the implementation framework which involve:

- Planning – green initiatives need to be factored into business strategy, future resource planning and budgeting exercises
- Execution – based on a robust planning in place and targets clearly defined and monitored, green initiatives need to be integrated across the value chain and a part of core business as follows:

  -green energy – manufacturers with high energy consumption need to shift towards cleaner energy and plan for efficiency improvements

  -green product – manufacturers to conduct evaluation of products parameters based on; how green are the resources and energy being used, how green is the product during the life cycle of its use and how green I the manufacturing process.
- Green processes in business operations; manufacturers need to gradually redesign business processes used in different parts of the value chain. This could include shifting to more sustainable manufacturing options, making changes towards reducing waste, increasing recycling, reusing resources and incentivising suppliers, channels, customers and employees to adopt a common path.

A well formulated promotion campaign and advisory programmes or the implementation framework involving planning and execution of these initiatives will be necessary across the big enterprises and SMEs in Malaysia.

III. CONCLUSION

It is anticipated that by 2030, green businesses will contribute an approximately 1.5% to the nation's Gross Domestic Product (GDP) or equivalent to RM60 billion from RM7.9 billion in 2013. This projection is supported by the Malaysian Government's commitment towards realizing the green business performance, increase of exports as well as cooperation from private sectors. This will also contribute to RM94.3 billion of total investment in green technology. Apart from that, the top 30 public listed companies which contributed about 15% of the national GDP had also committed to sustainability practice in their business operations. (GTMP)

The contribution of GT towards the economy growth, cleaner environment and enhanced well-being is critical. Realising this, the Government of Malaysia aims to build a firm foundation towards low carbon growth to augment the dire reduction of GHG thereby not only fulfilling the 45% carbon intensity reduction pledge but going beyond to join hands with the global community to achieve SDGs. The GTMP is crafted to pave the way to achieve ambitious targets come 2020 and 2030. GTMP positions Malaysia at the forefront of the global movement in climate change mitigation, while fulfilling its needs to leapfrog and becoming a high nation, driven by green growth.

Progress on the GTMP will rely heavy on human capital that is capable of the diligent pursuit of innovation and excellence and this reflected in the prominence of human capital development in ach of the key sector.

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