

## **Assessment of Imbalance among Environmental and Economic Performance within Malaysian Manufacturing Industry: A Sustainable Approach**

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### **ABSTRACT**

Sustainability has emerged as a key area of concern especially for manufacturing industry to address major environmental issues. Carbon dioxide emission has increased rapidly over the past few decades resulting in harmful outcomes such as global warming, climate change, water and air pollution and degrading environmental performance. The objective of this study is to assess a descriptive study evaluate the imbalance between economic and environmental performance of Malaysian manufacturing industry in general. Secondary data of both economic performance and environmental performance (2011-2016) was descriptively examined. The findings are revealed a significant imbalance between two indicators. In addition, this study also proposed a conceptual model based on previous literature how to reduce this imbalance and create sustainable performance within Malaysian manufacturing firms.

**Keywords:** Environment, Carbon Dioxide Emission, Environmental Performance, Economic Performance, Sustainability

**JEL Classifications:** L6, Q5, Q50, Q51

### **1. INTRODUCTION**

Human wellbeing and economic growth sustainability depends on how well we manage the environment (Stern, 2008; Horváthová, 2010; Howarth, 2012; Kahle and Gurel-Atay, 2013). Sustainability has emerged as a key area of concern especially for manufacturing industry to address major environmental issues. Carbon dioxide (CO<sub>2</sub>) emission has increased rapidly over the past few decades resulting in harmful outcomes such as global warming, climate change, water and air pollution and degrading environmental performance (international energy agency [IEA], 2015; Kazdin, 2009; Stern, 2011; Swim et al., 2011; Robertson and Barling, 2013; Al-Mulali et al., 2015). The growing environmental awareness among customers, governments, stakeholders' demands and stringent environmental regulations are building pressure on manufacturers to adopt environmental management system (EMS) and improve environmental, social and economic performance

(Berry and Rondinelli, 1998; Waddock et al., 2002; Khidir et al., 2010; Ghazilla et al., 2015).

Sustainable corporate performance (SCP) is a growing area of research vital for industrial growth and reduce the imbalance between economic, environmental and social performance (Hubbard, 2009; Maletic et al., 2015; Maletič et al., 2016). Manufacturing organizations should consider environmental and social aspects along with economic considerations, to ensure SCP and reduce negative impacts on society and environment (Elkington, 1994; Young and Tilley, 2006; Hubbard, 2009). SCP refers to the integration of three dimensions including economic, social and environmental performance (Norman and MacDonald, 2004). The manufacturing organizations in response to address the environmental problems (IEA, 2015; Kazdin, 2009; Stern, 2011; Swim et al., 2011; Robertson and Barling, 2013) are adopting sustainable human resource management (SHRM) practices

(Ehnert, 2009; Cohen et al., 2012) to ensure environmental protection and improve sustainable performance (SP). A further aspect of SHRM is Green HRM practices which provide a roadmap to sustainable HRM (Cohen et al., 2012). The term of Green human resource management (GHRM) was initially introduced by (Renwick et al., 2008) is relatively a new research area that aims to align HRM practices and environmental management (Jackson and Seo, 2010; Renwick et al., 2013; Jabbour, 2015). It is quite challenging for organizations human resource to implement environmental initiatives (Daily et al., 2011; Daily and Huang, 2001; Govindarajulu and Daily, 2004), because of growing international environmental standards (Daily and Huang, 2001) and low level of environmental compliance, ineffective environmental laws and regulations in developing countries (Cascio, 1997; Sudin, 2011). Since the GHRM practices perform a critical role in adopting EMS (Daily and Huang, 2001; Daily et al., 2009; Jabbour and Santos, 2008) to foster pro-environmental behaviours (Boiral et al., 2015).

EMS such as ISO 14001 is a well-established practical tool adopted by companies in developed countries. The employees' participation and involvement in EMS is highly required (Kitazawa and Sarkis, 2000; Boiral, 2007; Yin and Schmeidler, 2009). The first step to adopt and implement ISO 14001 increase environmental awareness within employees (Sakr et al., 2010). Similarly, EMS helps the company to develop, implement environmental policies, set objectives and targets for reducing environmental impacts and improving SP (González-Benito and González-Benito, 2005). The previous studies have reported that ISO 14000 EMS certified manufacturing companies can better manage environmental and economic performance (Eng et al., 2006; Darnall, et al., 2008; Testa et al., 2014; Aziati et al., 2015).

However, merely adopting the Green HRM practices and implementing EMS are insufficient to improve SCP. Consequently, the success of EMS depends on modification of traditional employees' behaviors towards more pro-environmental behaviours (Daily et al., 2009), to mitigate the imbalance between economic and environmental performance. Therefore, the EMS ISO 14001 cannot be more effective and successful without considering the vital role of pro-environmental behaviors (PEB) at workplace (Boiral, 2007; Christmann and Taylor, 2006). In nutshell organizations need to adopt Green HRM practices (Renwick et al., 2013) to foster PEB (Boiral and Paillé, 2012; Lamm et al., 2013; Lülfs and Hahn, 2013; Mesmer-Magnus et al., 2012; Ones and Dilchert, 2009; 2012a; Paillé and Boiral, 2013) such as organizational citizenship behaviour for the environment (OCBE) (Boiral and Paillé, 2012) to implement EMS ISO 14001 (Prajogo et al., 2014) and improve SCP.

## 2. GLOBAL OVERVIEW OF THE MANUFACTURING INDUSTRY

The World Energy Outlook (2015) special report by International Energy Agency has revealed that Global emissions of CO<sub>2</sub> stood at 32.1 billion tons (IEA, 2015). The two largest CO<sub>2</sub> emitters are China and the United States (IEA, 2015). On other hand,

global economy grew by 3.1% annually (IMF, 2015). Overall, industry's use of energy has grown by around 61% between 1971 and 2004, due to rapidly growing energy demand in developing countries and stagnant energy demand in OECD countries mainly include (United States, United Kingdom, Japan, Germany, Sweden, Australia). The Organisation for Economic Co-operation and Development (OECD) is an intergovernmental economic organisation with 35 member countries. The OECD countries will impose a CO<sub>2</sub> substantial cost of \$30/tonne by 2020; major non-OECD emerging economies like China will have CO<sub>2</sub> cost after 2030, ranging from \$35 to \$40/tonne by 2040 (Newell et al., 2016). The industry is a key contributor to economic growth and prosperity. According to the World Bank, in 2013, the total amount of CO<sub>2</sub> emissions from manufacturing industries in Malaysia were 53 million metric tons or 20 percent of total CO<sub>2</sub> emission (IEA, 2015).

## 3. SUSTAINABILITY CHALLENGES TO MALAYSIAN MANUFACTURING INDUSTRY AND ECONOMY

Malaysia is a newly industrialized country backed by well-planned government support in economic and industrial development. The industry is contributing around 41% of the gross domestic product (GDP) with a growth rate of 7.5% annually. Malaysia is ranked 28<sup>th</sup> by GDP amounting 815,646 (USD). Malaysia has ranked 24<sup>th</sup> globally amongst all exporting countries, leading exporter of electronics, oil and gas, palm oil and rubber which drive the economic growth (IMF, 2016). Other key industries include, light manufacturing, pharmaceuticals, medical technology, tin mining and smelting, logging, and timber processing. Malaysia's exports are expected to grow 10.1% annually to US\$ 407 billion in 2017. The world economic forum (WEF) inaugural inclusive growth and development report 2015-2016, has ranked Malaysia 18<sup>th</sup>, the second-best economy after Singapore in Association of Southeast Asian Nations (ASEAN), on global competitive index. Thailand is ranked 32<sup>nd</sup> followed by Indonesia with ranking position of 37<sup>th</sup> in the ASEAN region (WEF, 2016).

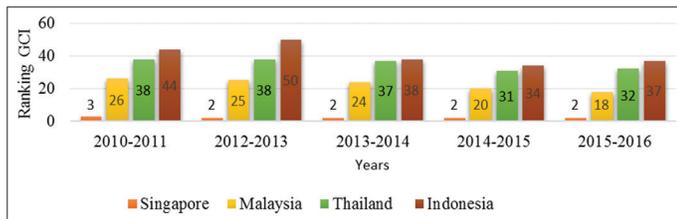
The industry related indicators include skills development, employment and labour compensation, asset building and entrepreneurship, financial intermediation of real economy investment. The statistics in Figure 1 revealed the that Malaysia position has made 8 points increase in their ranking spot from 26<sup>th</sup> to 18<sup>th</sup> in the (WEF, 2016).

The 10<sup>th</sup> Malaysian Plan (2011-2015) has focused on socio-economic development to sustain the Malaysian economy and ensure high growth rate and income. According to the statistics reported in Table 1. Contribution of manufacturing sector to GDP has increased from RM 192.5 to RM 243.9 billion in 2015 representing 23% with a growth rate of 4.7%. The total exports of manufactured goods have increased from RM 489.6 to 636.7 billion from 2010 to 2015. The share to total exports has raised from 76% to 81% respectively. This sector has contributed around 18% of share in total employment for year 2015 (Department of Statistics, 2015; Economic Planning Unit, 2015).

**Table 1: Major indicators of manufacturing sector, 2010-2020**

Items	2010	2015	2020	10 <sup>th</sup> MP (achieved)	11 <sup>th</sup> MP (targets)
Contribution of manufacturing sector to GDP (RM billion)	192.5	243.9	312.5	1,110.9	1,417.3
Annual growth rate (%)	12.1	4.7	4.4	4.8	5.1
Share to GDP (%)	23.4	23.0	22.1	23.1	22.5
Total exports of manufactured goods (RM billion)	489.6	636.7	812.8	2,801.3	3,677.9
Share to total exports (%)	76.6	81.8	83.4	76.4	82.8
Share to total employment (%)	17.0	18.0	18.2	3.9	2.5

Source: Economic Planning Unit (2015-2020). GDP: Gross domestic product

**Figure 1: The global competitiveness index WEF (2010-2016)**

The Malaysian government is committed to maintain, preserve and enhance its manufacturing sector through various green initiatives. The Eleventh Malaysia Plan, (2016-2020) provides a critical platform for Malaysian economy and industry to join the list of high growths emerging and green economies in 2020. The manufacturing sector is forecasted to grow with 5.1% per annum, contributing, 22.1% to GDP in 2020 as highlighted in Table 1 (Economic Planning Unit, 2015). Overall, the sector is expected to provide 2.5 million jobs, representing 18% of total employment in 2015. The manufacturing sector is expected to grow at 5.1% per annum, contributing 22.1% to GDP and 18.2% of total employment in 2020 (Department of statistics, 2015; Economic planning unit, 2015).

The first initiative is to focus on Green growth (resource-efficient, clean, and robust) ensuring the Malaysian government commitment to grow the economy and industry by protecting the environment for present and future generations. The Eleventh Malaysia Plan (2016-2020) has highlighted key manufacturing industries related environmental issues such as increasing CO<sub>2</sub> emission, environmental waste and hazards and depletion natural resources. The government will continue to take measures and pursue the green growth goal under the EMP (2016-2020). In addition, it focuses to foster sustainability agenda enabling green growth, sustainable consumption and production, conserving natural resources to mitigate environmental problems. The government has announced a voluntary commitment to reduce 40% of CO<sub>2</sub> emissions by 2020 (Kamaruzzaman et al., 2016). These actions will further reduce industrial and environmental waste.

The CO<sub>2</sub> emissions have increased rapidly over the years as a result of increasing energy consumption and rapid economic growth in Malaysia. However, direct and indirect energy consumption contributes to CO<sub>2</sub> emission that harms the environment. According to the World Bank in 2013, the total amount of CO<sub>2</sub> emissions from manufacturing industries was 53 million metric tons or 20 percent of total CO<sub>2</sub> emission in Malaysia. Over the years, manufacturing industry is growing in Malaysia. With respect to this government has to ensure policies and regulations about

ensuring sustainability and safety of the environment. According to Business-As-Usual (BAU) Scenario that major sector of CO<sub>2</sub> emissions come from electricity generation (43.45%), transport sector (30.25%), followed by industrial sector (26.26%) and finally residential sector (0.03%) in 2020 (National Energy Balance, 2005).

## 4. ECONOMIC PERFORMANCE

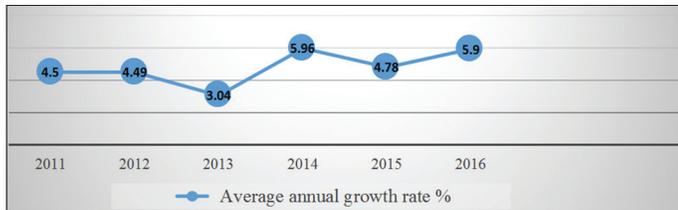
Malaysian manufacturing sector grew with rate of 4.78% in December 2015 and expected to grow by 5.9% in 2016. Figure 2 depicts the increasing trends in average growth rate from 2011 to 2016. The average annual growth rate was 4.5% in 2011 and reduced significantly in 2013-3.04 on average but regained the momentum in 2014 and 2015 from 3.04% to 5.96 and 4.78% respectively. The major sub-sectors which recorded an expansion in February 2016 were: Electrical and Electronics Products (5.8%); petroleum, chemical, rubber and plastic products (2.9%) and Wood Products, Furniture, Paper Products, Printing 9.6%. (Department of Statistics and Ministry of Finance Malaysia, 2011-2016).

The manufacturing sector has grown at 4.8% per annum on average during the 10<sup>th</sup> Malaysia Plan, and made around 23% contribution to GDP in 2015, as shown in Figure 3 Manufactured goods also dominated other sectors (agriculture goods and mining) exports, contributing 80% of total exports in 2015. Figure 4 shows that manufactured goods contribute around 80% to the exports amounting RM 625.46 billion. The share of agricultural goods and mining goods are 8.6% and 10% respectively to the total export amount RM 779.95.

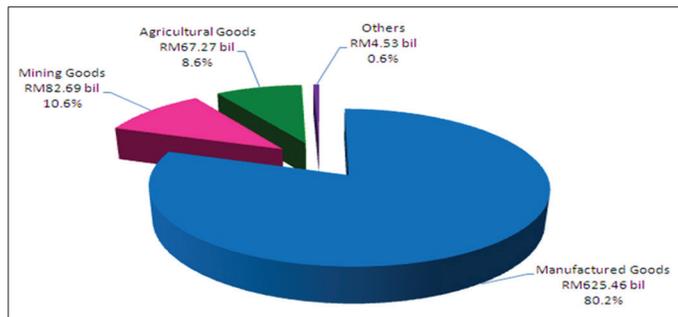
## 5. ENVIRONMENTAL PERFORMANCE

According to the Compendium of Environment Statistics Malaysia, 2013/14, although the manufacturing sector is one main contributor to the GDP of Malaysia, it is also one of the main contributors to environmental pollution. The manufacturing sector has contributed amount RM 1,328.5 million for environmental protection to reduce environmental damage caused by manufacturing companies. Consequently, all the activities in the manufacturing sector that produce pollutants which result in poor environmental performance (Compendium of Environment Statistics Malaysia, 2014/15). Environmental performance index (EPI) have reported the unstable spot of Malaysia throughout the past versions of the EPI. Figure 4 illustrates that in 2006 EPI, the country ranked 9<sup>th</sup> followed by 26<sup>th</sup> in 2008, 54<sup>th</sup> in 2010, 25<sup>th</sup> in 2012, and 51<sup>st</sup> in 2014 and recently ranked 63<sup>rd</sup> in 2016 on EPI index. In comparison, the ASEAN member country Singapore has improved their ranking

**Figure 2:** Manufacturing industry growth rate: Department of Statistics Malaysia, (2011-2016)



**Figure 3:** Components of Malaysia’s Exports 2015



Source: Department of Statistics Malaysia (2015)

**Figure 4:** Environmental performance index: Malaysian versus Singapore EPI (2006-2016)



position significantly by improving from lowest 52<sup>nd</sup> in 2012, 4<sup>th</sup> in 2014 and currently sliding down to 14<sup>th</sup> in 2016.

## 6. DISCUSSION AND CONCLUSION

In recent years, the importance of the sustainability agenda for the manufacturing industry has become inevitable. The manufacturing industry is one of the major source of environmental problems worldwide. The IEA has reported that nearly 36.8% CO<sub>2</sub> emission contributed by manufacturing industries to the environment worldwide (IEA, 2016). Although Malaysian manufacturing industry provides approximately 23% share to GDP in sustaining economic growth and development (Department of Statistics, Malaysia 2014/15). However, statistics indicate that industry is responsible for around 53 million metric tons of total CO<sub>2</sub> emission. The industrial sector is the third larger contributor to CO<sub>2</sub> emissions in Malaysia with 26.26 % after transport, power and electricity generation. Emissions from industrial sector contributed by manufacturing are mainly electronics, chemical and rubber industries (IEA, 2015). The BAU research survey has estimated the CO<sub>2</sub> will increase up to 285.73 million tons by 2020, because of growing energy and industrial production demands (National Energy Balance, 2005). The growing increase in CO<sub>2</sub> emission by

industrial sector result in major atmospheric pollution and solid wastes (Al-Khidir and Zailani, 2009) reducing environmental performance (Compendium of Environment Statistics Malaysia, 2014/15).

The degradation of environment as the outcome of industrial production creates imbalance among economic and environmental performance (Horváthová, 2010). The growing environmental issues have forced the manufacturing organizations to adopt EMS (Khidir et al., 2010; Ghazilla, et al., 2015). The implementation of EMS ISO 14001 has become important environmental standards for all companies irrespective of their size, sector or nature worldwide (Zutshi and Sohal, 2004). In developed countries, the Companies have higher tendency in getting ISO 140001 certification by adding environmental value to improve SP and foster industrial development (Krut and Gleckman, 1998; 2013). The ISO 140001 survey has revealed, that the rate acquiring of EMS ISO 14001 certification by companies are miserably low in developing countries as compared to the most developed OECD countries (US, UK, Japan, Germany, Sweden, Australia). since mostly companies are lagging behind in developing countries of AISA and complain about cost consideration, extensive documentation, economic and social barriers in acquiring ISO 140001 certifications (Krut and Gleckman, 2013; Babakari et al., 2003).

Lack of required GHRM practices and policies, ineffective environmental regulations are the major challenges for companies in developing countries to implement ISO 14001 EMS (Zutshi and Sohal, 2004; Massoud et al., 2010). Similarly, in the context of Malaysia only 490 manufacturing companies have ISO 140001 certification out of total 2561 manufactures registered with Federation of Malaysian Manufacturers in 2015. Similar evidence has reported by Malaysia external trade and development corporation (MATRADE) about ISO 14000 certification. The ISO 140001 certified manufacturing companies comprise of only 18% of total registered companies which show less tendency of following environmental standards, compliance and regulations of EMS in Malaysia. The research statistics have reported that overall environmental performance reduced significantly in past 10 years (EPI, 2006-2016). While the government, corporations, and industries are primarily responsible for the dramatic decrease in environmental performance. The Malaysian manufacturing firms are facing barriers in adopting green initiatives (Wooi and Zailani, 2010) and the drive for sustainable practices (Seidel et al., 2011; Rosen and Kishawy, 2012; Nordin et al., 2014) is important to make shift towards more sustainable manufacturing practices by adopting Green HRM practices, and implementing EMS (Zubir and Habidin, 2012).

The 11<sup>th</sup> MP (2016-2020) focuses on to foster sustainability agenda and committed to improve sustainability performance. To meet the targets of 11<sup>th</sup> MP in 2020 the Malaysian industry should adopt sustainable green HRM practices and implement EMS to foster green growth, improve SP (economic, environmental and social) and reduce CO<sub>2</sub> emissions from manufacturing sector. The Malaysian Standards based EMS is applicable to all the organization, regardless of size, type and nature, and encourage

companies to adopt ISO 14000. The EMS ISO 14001 helps organizations to enhance environmental performance, fulfilment compliance obligations and achieve environmental objectives (Department of Standards Malaysia, 2016).

However, researchers believe that merely implementing Green HRM practices and adopting EMS cannot improve SCP. Consequently, the success of EMS and GHRM practices depends on pro-environmental behaviours (Daily et al., 2009), to mitigate the imbalance between economic and environmental performance and improve SP. Therefore, the EMS ISO 14001 cannot be more effective and successful without considering the vital role of PEB at workplace (Boiral, 2007; Christmann and Taylor, 2006). Therefore, to overcome this problem the current study will examine the relationship among sustainable GHRM practices, organizational citizenship behavior for the environment (OCBE) and EMS to predict SP (SP) at Malaysian manufacturing industry.

Malaysian economy and industry is facing the sustainability challenge to balance the economic, social and environmental performance especially in industrial sectors to meet the growing energy and production demand, without degrading the environment. The manufacturing sector is one of a significant contributor to GDP, exports, and vital source of foreign investment and job creation (Department of Statistics, 2015; Economic Report 2014/2015). However, the imbalance between economic and environmental performance, resulting environmental problems. Taking into consideration the growing energy and production demands for sustainable Malaysian economy. It is a prerequisite that manufacturing industry needs to adopt sustainability agenda as planned in EMP (2016-2020). In addition, it addresses the barriers and enablers to the SP of manufacturing companies in Malaysia. Therefore, this study scope is limited to the manufacturing industry of Malaysia.

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