

## A Framework of a Sustainable Performance Measurements (SPMs) Model for the Malaysian Electronic and Electrical Industry

*<sup>1</sup>Teh Boon Heng, <sup>1</sup>Chong Lee Lee, <sup>1</sup>Yeap Peik Foong and <sup>2</sup>Ong Tze San*

<sup>1</sup>Faculty of Management, Multimedia University Malaysia

<sup>2</sup>Faculty of Economics and Management, University Putra Malaysia

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**Abstract:** This conceptual paper is initiated by the growing awareness of environmental and social responsibility issues. Companies' excellent performance is no longer championed solely on financial matters but has expanded to environment and social perspectives, calling for the need for a sustainable performance measurements (SPMs) model. Frequent and in-depth sustainable reporting are expected to be more demanding and comprehensive in the future with an intense pressure on and expectation of various stakeholders. The adoption of sustainable performance reporting is already in place in developed countries such as Europe, the United States (US) and the United Kingdom(UK), but reporting is relatively low among developing nations especially countries from Asia; Malaysia is no exception. This is due to the fact that sustainability performance reporting in Malaysia is still in its infancy phase and is subject to plenty of uncertain issues particularly on SPMs models that need to be managed, measured and reported on. The SPMs model is developed to be applied in the Malaysian electronic and electrical industry as this industry is subjected to intense scrutiny from Western Nations in term of environmental and social compliance. This paper, therefore, aims to mitigate the problem by constructing a framework of SPMs models in order to promote genuine sustainable reporting among the industry.

**Key words:** Sustainable performance measurement model • Environmental and social reporting • Electrical and electronics industry • Malaysia

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### INTRODUCTION

According to Bloomberg [1], the Australian government will impose environmental tax amounting to AU\$23 (RM69) per metric ton on the 500 most polluted corporations in Australia from mid-2012. Eventually, on 19th March 2012, Australia's parliament passed laws for a new 30% tax on iron-ore and coal mine profits after a bruising two-year battle with mining companies. The tax will affect about 30 companies, including global miners BHP Billiton, Rio Tinto and Xstrata and will take effect from 1st July 2012 [2]. Simultaneously, the controversial Lynas rare earth plant investment in Pahang, Malaysia will be only allowed to commence if the company complies with all environmental and social recommendations made by the independent review panel appointed by the International Atomic Energy Agency (IAEA) [3]. In fact, the construction of the rare earth plant has sparked the

biggest ever environmental rally or demonstration against Australian-based Lynas Plc Ltd. On 26th February 2012, an estimated 5,000 citizens together with Malaysian civil society organisations converged in Kuantan for a rally to protest against the Lynas project and to demand a clean and safe future for Malaysia. The 'Stop Lynas' campaign has escalated into the biggest ever environmental issue for the country. Participants arrived from all over the country including the east Malaysian states of Sabah and Sarawak [4].

These simultaneous events highlighted one concern: awareness environmental and social responsibility is increased now. For corporations, they are bound to environmental and social responsibility; firms that fail to comply with environmental and social requirements will suffer massive financial loss. For instance, firms will be fined or taxed huge amounts or will even be instructed to terminate their business operations. No doubt, the

requirements for reporting key environment and social indicators in the published annual report are expected to increase in the future. In short, companies' excellent performance is no longer championed solely on financial matters but has expanded to environment and social perspectives which is named as sustainable performance.

Corporations with sustainability considerations have business objectives that are beyond the conventional realms. Their business objectives are not only narrowed from conventional aims such as operational and financial excellence but are also embedded within environmental and social initiatives [5]. Accordingly to the Dow Jones Sustainability index, corporate sustainability is "a business approach that creates long term shareholder value by embracing opportunities and managing risks deriving from economic, environmental and social developments" [6, p. 27].

Interestingly, two of the world's largest and most successful corporations are firms actively engaging with sustainable practices [7]. Apple Corporation based at California, USA-the largest technology corporation in the world in terms of market capitalisation-has already taken the lead in disclosing carbon impact or sustainable reporting. Equally, Wal-Mart Corporation from Arkansas, US-the largest corporation in the world in terms of company revenue-has demanded its suppliers to disclose their sustainability performance to align with its sustainability goal. These two leading and great companies have remarkable influence on the corporate world as millions of firms either imitate or are strongly influenced by them. Consequently, their initiatives have not only implied the prominence of sustainable reporting; more important is their reinforcement in future patents and criteria of company performance reporting to incorporate sustainable performance reporting.

**Development of Performance Measurementsmodel:**

Recently, firms have been becoming more aware of the essential importance of sustainable performance reporting and a growing number of companies are keen to adopt a broader and more comprehensive performance measurements model for their performance [8]. As a result, 40-60% of firms have already started expanding their traditional financial performance measurements or wider performance measurements to sustainable performance measurements to incorporate environmental and social initiatives (Table 1) [8-11]. This move is due to the fact that a purely traditional financial performance measurementsmodel is no longer relevant, competent and sufficient for companies. The traditional reporting is under severe criticism as the purely traditional financial performance is perceived as historically focused, lagging measurement, not externally focused, rarely integrated or aligned to the business processes, or merely serves the interest of shareholders only [12-29].

However, a more sophisticated performance measurementsmodel incorporating wider performance measurementsis also exposed to numerous drawbacks and weaknesses. Wider performance measurements are criticised for not developing a systematic way of incorporating new organisational performance measures, such as those associated with environmental responsibility and community relationships. For this reason, sustainable performance measurementshas emerged as the most competent and comprehensive performance reporting model for companies particularly with an intense pressure and expectation from a wide range of stakeholders [5, 8, 10, 11, 30-32].

Table 1: An Evolution of Sustainable Performance Measurements Model (SPMs)

Traditional Financial Performance Measurements	→	Wider Performance Measurements	→	Sustainable Performance Measurements (SPMs)
Measurement characteristic		Measurement characteristic		Measurement characteristic
Limited on financial district only		Economic perspective only: financial and non-financial but associated to economic		Economic, environment and social perspective
Example:		Example:		Example:
Return on Investment (ROI), Return on Equity (ROE), earning per share and etc.		SMART system,		Global Reporting Initiative (GRI), Environmental Sustainability Index,
Targeted Group		balanced scorecard,		Sustainability Value and etc.
Shareholder only		Cambridge performance measurement process and etc.		Targeted Group
Year of Implementation Early 1980		Targeted Group		Shareholder and
		Shareholder and direct stakeholders only		All stakeholders
		Year of Implementation Early 1990		Year of Implementation
				Early 2000

Sources: [3, 5, 8-12,15-17,19-21,23,26, 29, 31,32].

Consistently, stakeholder theory also concurs with the above phenomena and further emphasises the need of corporate accountability to a broad range of stakeholders [33]. This argument comes from the fact that companies, especially multinational or transnational corporations, are large and powerful and have a severe impact on society and the environment. Business is not only accountable to shareholders, but also a wide range of stakeholders including employees, customers, suppliers, regulators, pressure group, communities and others.

Over time, stakeholders that range from employees to communities have persistently called for greater corporation accountability towards society and the environment [10, 11, 30, 32]. Shareholders, whose only concern is monetary interest, have shown significant changes in perception with regards to their desires and expectations. An increasing number of shareholders refer to social and environmental indicators when making investment decisions, as supported by the findings of two powerful shareholder lobby groups: The Interfaith Centre for Corporate Responsibility (ICCR) and Trucost Organisation [7]. ICCR aims to build a more sustainable world by integrating social and environmental values; meanwhile, Trucost Organisation is an organisation aiming to help other organisations understand the true cost of business in order to utilise resources more efficiently today and tomorrow. Both ICCR and Trucost have actively and jointly promoted sustainable practices across investors and have called out for sustainability concerns as one of the leading categories of investors' decisions. Currently, they jointly publish a paper that specifically focuses on tracking the "Environmental Indicators:

New Benchmarks for Evaluating Corporate Performance" and this is expected to stir the investors' investment decisions favouring environment and social initiatives.

Business leaders particularly from multinational corporations like Apple Corporation and Wal-Mart Corporation realise the importance of sustainable practices to survive in global competition. Products or processes associated with more environmental ethics usually will earn a good reputation and ultimately transform into economic gain. The economic gain will be more material and significant with firms engaging in international trade [10, 34]. Thus corporations which comply with stringent regulations, avoid serious liabilities, satisfy the safety concerns of employees and respond to government regulators and shareholders are more likely to protect or enhance their ethical image and, of course, remain competitive.

**Development of Global Sustainable Reporting:** It is almost inevitable that expectations and requirements for sustainable reporting (economic, environment and social perspectives) will increase dramatically. According to KPMG's 2011 International Survey of Corporate Sustainability Reporting [35], approximately 95% of the world's 250 largest companies have already issued sustainability reports in 2010, a huge surge compared to 2005 which was only 50%. The popularity of sustainable reporting unveiled by KPMG's survey is consistent with Global Reporting Initiative's (GRI) sustainability report [36] released by GRI as shown in Figure 1. Over the past decade, the number of GRI sustainability reports has increased approximately thirty-fourfold reaching

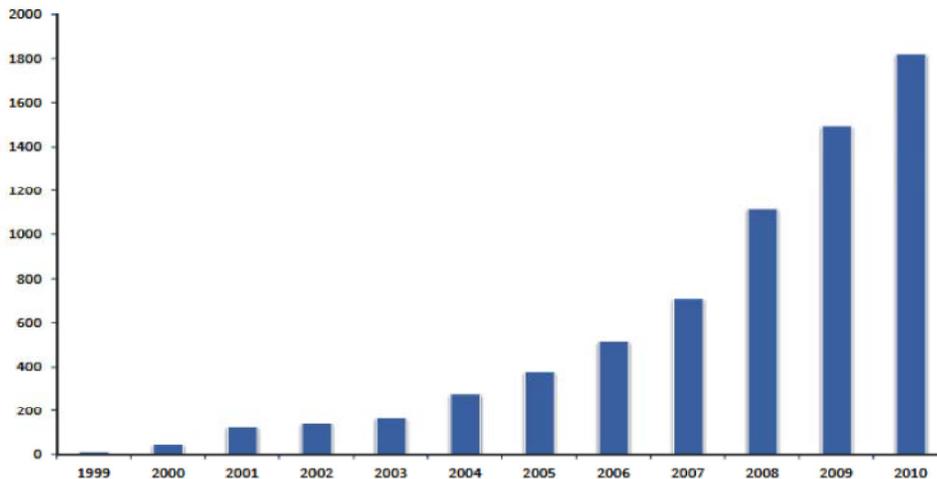


Fig. 1: Survey of Corporate Sustainability Reporting from 1999-2010  
Sources: Global Reporting Initiative [36]

Table 2: Sustainable Reporting by Country, 2010

Country	Percentage of World Total(%)	Global 500-HQ's in country
United States of America	10%	28% (139)
Spain	9%	10% (10)
Brazil	7%	2% (7)
Japan	7%	14% (71)
Sweden	6%	1% (5)
Australia	4%	2% (8)
Netherlands	4%	3% (13)
Canada	4%	2% (11)
Germany	4%	7% (37)
United Kingdom	3%	6% (29)

Sources: Global Reporting Initiative [36]

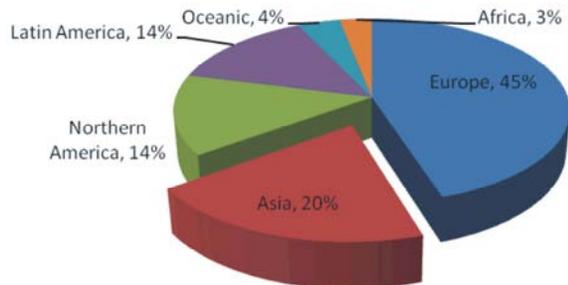


Fig. 2: Sustainable reporting by region 2010

Sources: Global Reporting Initiative [36]

1,800 numbers of reports in 2010 compared to merely 50 reports in 2000. Predictably, the frequent and in-depth sustainable reportings expected to be more demanding and comprehensive in the future with an intense pressure and expectation of a wide range of stakeholders especially from regulators.

**Development of Asian Sustainable Reporting:** Even though there is a remarkable result in terms of the boost of sustainable reporting in developed nations, the reporting is relatively low among developing nations especially countries from Asia [36]. Asia, as the home of second and third largest economy with two-thirds of world's population, only manages to rank second in term of numbers of the GRI sustainability report (Figure 2). Asia is significantly lagging behind Europe, with double the number of the GRI sustainability reports published by Europe.

Among the Asian countries, only Japan was ranked among the 10 highest sustainable reporting nations in 2010, as shown in Table 2. With this significant low sustainability reporting in Asia, there is an urgent need to study the sustainable reporting for countries in Asia, particularly Malaysia.

**Development of Malaysian Sustainable Reporting:**

According to the Asian Sustainability Rating (ASR) 2010, in all Malaysian sectors almost all companies score below 25% for their environmental reporting, which are severely lagging in terms of Asian Sustainability Rating (ASR). Malaysian companies achieve reasonably strong scores within the social category, with leading companies reporting diligently on their stakeholders' engagement with customers, employees, suppliers and the communities in which they operate. However, those leading companies are prominently foreign-owned companies such as DigiBerhad and British America Tobacco Berhad.

ASR is an environment, social and governance (ESG) benchmarking tool developed by Responsible Research and CSR Asia. It was launched in 2009 to examine publicly available information of the leading listed companies in 10 Asian countries consisting of China, Hong Kong, India, Indonesia, Malaysia, Philippines, Singapore, South Korea, Taiwan and Thailand. The ASR research methodology uses a proprietary set of 100 indicators covering all areas of sustainability. These sustainable indicators are grouped into four ASR categories-general, environment, social and governance-and were carefully selected in order to represent the most realistic assessments of achievable best sustainability practices for Asian companies in 2010. It provides investors, companies and other stakeholders a view of the strategic sustainability of these companies.

Based on ASR 2010 [37], a study of Malaysia's sustainable reporting is essential and relevant for the sake of the nation's interest. In fact, in 2006 Bursa Malaysia launched a framework as a guide for publicly listed companies in implementing reporting on sustainability issues. In addition, the listing requirements were altered and tightened to include arequirement to provide a description of the corporate social responsibility activities or practices undertaken by the listed issuer and its subsidiaries. This initiative taken by Bursa Malaysia implies an urgent need to study and implement sustainable reporting among Malaysian companies, particularly the electronic and electrical industry.

**Problem Statement:** Generally, it is undeniable that in a country like Malaysia, sustainability performance reporting is still in its infancy phase and is subject to plenty of uncertain issues particularly on sustainable

performance measurement model (SPMs) that need to be managed, measured and reported on [7, 38, 39, 40, 41, 42]. If analysing current companies' sustainable reporting practice, a lack of alignment between companies' desired sustainable goals and sustainable performance measurement is seen. Sustainability goals remain disconnected from operation. In addition, major differences emerge from sustainable reporting practices between countries, between industries and between companies [43, 44]. Obviously such confusions have hindered the adoption of sustainable performance reporting among companies, especially companies from the electronic and electrical industries which are complicated by characteristics fast moving in nature, high rates of innovation and high degrees of research and development activities [26, 45, 46]. Indeed, some management that currently portrays high commitment to sustainability performance is viewed as another public relations exercise without any substance. In addition, contingency theory also highlights that no universal performance measurement can be applied equally to all organisations in all circumstances and it depends upon organisational contextual factors. Empirical research also shows that industries and organisations tend to focus on different measures because of different context and issues [38]. As a result, Malaysian firms, particularly the electronic and electrical industry that are categorised as fast moving and changing in nature, are required to update and sharpen their performance measurements more regularly compared to other industries.

In a nutshell, sustainable performance reporting seems to be a "must" for companies in the future, even though in many business organisations and countries, especially Asian countries like Malaysia [37], adoption of sustainable performance reporting is still relatively low. In conjunction with this, the pressure will be concentrated particularly on the Malaysian electronic and electrical industry since the electronic and electrical industry not only serves as the prominent driver of economic growth but is also the largest exporter for Malaysian products [26], which exposes it to global presence and intense scrutiny of a wide range of stakeholders, especially major customers from Western countries in terms of environment and social compliance [7, 10, 34, 47]. Obviously the success of the electronic and electrical industry no longer relies on finances alone but also on environments and social achievement.

This study, therefore, aims to mitigate the problem by constructing a framework of an SPMs model for the Malaysian electronic and electrical industry in order to promote genuine sustainable reporting practice in the industry.

**Research Questions:** What is the framework of the sustainable performance measurements (SPMs) model for the Malaysian electronic and electrical industry?

**Research Objectives:** To construct the framework of a sustainable performance measurements (SPMs) model for the Malaysian electronic and electrical industry.

**Current Sustainability Reporting Practices:** The origin of sustainability dated to 1989 when the Coalition for Environmentally Responsible Economics (CERES) disclosed the Valdez Principles—a 10-point code of conduct that comprised a commitment to report on environmental management results. Since then numerous companies have started to publish information on their environmental, social, or sustainability policies [43, 48, 49]. For instance, triple bottom line (TBL) agenda [50, 51] is being developed and has become one of the most important references for sustainable reporting. In 1997, environmental and social reporting came to a turning point with the launch of Global Reporting Initiative (GRI) by Coalition for Environmentally Responsible Economics (CERES) in partnership with the United Nations Environmental Programme. The first official edition of the GRI Guidelines was released in June 2000 and the second revised edition of the GRI was released on August 2002 in Johannesburg during the World Summit on Sustainable Development. The third was released in October 2006. It must be highlighted that, while sustainability or social and environmental reporting has increased globally, overall there are also clear differences emerging from sustainable reporting practice between countries, industries and companies [43, 52].

So far the most common organisational response to reporting on sustainability performance is publishing a sustainability report, either integrated in, or separately from, the company's annual report [38]. Robins [53] estimates that there are already more than 60 different codes of sustainable practice worldwide that an organisation attempts to adhere to. Meanwhile, Leipziger [54] has identified 32 different sets of standards of sustainable practices. Table 3 summarises six of the more commonly used or discussed SPMs models as follows [33, 55].

Table 3: Six of the More Commonly Used Sustainable Performance Measurements Models

Sustainable Performance Measurements (SPMs)			
Type	Economic Perspective	Environment Perspective	Social Perspective
Global Reporting Initiative (GRI) Sources: [56]	<ul style="list-style-type: none"> <li>a. Direct economic value generated.</li> <li>b. Financial assistance received from government.</li> <li>c. Coverage of organisation's defined benefit</li> </ul>	<ul style="list-style-type: none"> <li>a. Materials, energy and water used</li> <li>b. Emissions, effluents and waste</li> <li>c. Noise and vibrations</li> <li>d. Waste heat</li> <li>e. Transport</li> </ul>	<ul style="list-style-type: none"> <li>a. Employment</li> <li>b. Training and education</li> <li>c. Employment diversity and opportunity</li> <li>d. Labour/Management relations</li> <li>e. Customer health and safety</li> <li>f. Competition and Pricing</li> </ul>
Sustainable Value Sources: [57]	<ul style="list-style-type: none"> <li>a. Direct and indirect internal stakeholders</li> <li>b. Direct and indirect stakeholders in the value chain</li> </ul>	<ul style="list-style-type: none"> <li>a. Emissions (air, water and soils)</li> <li>b. Waste material input/material intensity</li> <li>c. Noise and vibrations</li> <li>d. Waste heat</li> </ul>	<ul style="list-style-type: none"> <li>a. Direct and indirect stakeholders in the local community</li> </ul>
Sustainability Sources: International consulting firm [7]	<ul style="list-style-type: none"> <li>a. Commitment to Triple Bottom Line</li> <li>b. Engaging business partner</li> </ul>	<ul style="list-style-type: none"> <li>a. Focus on environmental process</li> <li>b. Focus on environmental product</li> </ul>	<ul style="list-style-type: none"> <li>a. Socio-economic development</li> <li>b. Ethics, values and principles</li> <li>c. Accountability and transparency</li> <li>d. Human rights and workplace conditions</li> </ul>
Full Cost Accounting (FCA). Sources: [58]	<ul style="list-style-type: none"> <li>a. Tier 1-Usual cost.</li> </ul>	<ul style="list-style-type: none"> <li>a. Tier 2-Hidden and externalities cost</li> <li>b. Tier 3-Overhead and indirect cost</li> <li>c. Tier 4-less tangible cost</li> <li>d. Tier 5-Environment focused cost.</li> </ul>	<ul style="list-style-type: none"> <li>a. Tier 2-Hidden and externalities cost</li> <li>b. Tier 3-Overhead and indirect cost</li> <li>c. Tier 4-less tangible cost</li> <li>d. Tier 5-Environment focused cost.</li> </ul>
Asian Sustainability Rating (ASR) Sources: [59]	<ul style="list-style-type: none"> <li>a. Governance policy, reporting.</li> <li>b. System</li> <li>c. Financial control Board quality and independence</li> <li>d. Audit quality</li> </ul>	<ul style="list-style-type: none"> <li>a. Assessment of environment policy</li> <li>b. Use of international environment management system</li> <li>c. Reporting of resources inputs including energy and water and outputs such as waste</li> </ul>	<ul style="list-style-type: none"> <li>a. Assessment of engagement with community, suppliers, employees and customers.</li> </ul>
Environmental Footprint Sources: [60]	<ul style="list-style-type: none"> <li>a. Impact on stakeholders</li> </ul>	<ul style="list-style-type: none"> <li>b. Depletion of natural resources society</li> <li>c. Noise and aesthetic impacts</li> <li>d. Residual air and water emissions</li> <li>e. Long term waste disposal is exacerbated by excessive product packaging</li> </ul>	<ul style="list-style-type: none"> <li>a. Change in local quality of life</li> <li>b. Uncompensated health effects</li> </ul>

**Framework of Sustainable Performance Measurements (SPMs) Model for Malaysian Electronic and Electrical Industry:** Sustainability considerations indicate business objectives beyond the conventional territory; they expand from traditional aims such as operational and financial excellence to environmental and social excellence [5, 31]. Essentially, bringing in the concept of sustainability into organisational philosophy has implications for business strategy which, in turn, affects how the firms measure performance [55]. As a consequence, an SPMs model is defined as an assessment of companies' achievements on three important pillars: economic, environment and social excellence [5, 31, 61, 62].

The framework of an SPMs model for the electronic and electrical industry will be determined via the

reference on the most commonly used SPMs models shown above, especially the Global Reporting Initiative (GRI), complemented with a related literature review, particularly on high manufacturing industry or emerging countries like Malaysia. Out of all the characteristics, three major aspects can be grouped and categorised as economic, environment and social [5, 31, 61, 62]. Thus in this particular conception paper the framework of the SPMs model will be designed consistently with three aspects and the design of sustainable measurement will adhere to good performance measurement concepts including those that are acceptable, accurate, affordable, measurable, relevant and understandable [63]. The three aspects-economic, environmental and social-will be discussed thoroughly in the following sections.

**Economic:** Székely and Knirsch [61], whose research pertains to “Responsible Leadership and Corporate Social Responsibility” on leading companies in Germany, presented the sustainable performance measurements as three aspects: economic, environment and social. These measurements are consistent with the Global Reporting Initiative (GRI), the mostly used and highly recognised sustainable measurement. With Germany as the leading hub of the electronic and electrical industry as well as one of the top 10 leading countries in world in terms of sustainable reporting initiatives, these measurements provide very useful and reliable references. The key measurements for economic aspects are shown as follows:

- Financial performance indicators: net profit/earnings/income/gross margin/ return on equity, return on operating assets
- Tangible and intangible investments: capital investments, Research and Development (R and D), knowledge, human capital, reputation, brands, networks, partnerships
- Impacts on investors: return on capital deployed
- Impacts on employees: remuneration, benefits, training opportunities and budgets, pay equity ratios, redundancy provisions, personal and/or career development
- Impacts on governments: taxes, tax breaks, subsidies, royalties
- Impacts on communities: job creation, infrastructure, development, technology transfer, social capital formation.

Interestingly, Székely and Knirsch [61] have also visibly presented key economic measurements for leading electronic and electrical firms in Germany-BASF, Henkel, Robert Bosch and Siemens. With similar industries under study, the following measurements are certainly useful as references.

- BASF: sales (total and per division), net income, earnings per share, cash flow
- Henkel: sales (total and per division), operating profit, production volumes
- Robert Bosch: sales, net income, R and D investment
- Siemens: sales, net income, earnings per share, investment R and D total and percentage of sales, personnel costs (wages, salaries, social welfare contributions, pension plan expenses, employee benefits)

Meanwhile, Intelligent Manufacturing Systems (IMS), an industry-led, global collaborative research and development programme, has been established to develop the next generation of manufacturing and processing technologies by providing an effective ongoing roadmap for sustainable manufacturing. IMS, which is an initiative from Japan, has generated key indicators for sustainable manufacturing via research and workshops [64]. This sustainable measurement is also developed based on the GRI initiatives framework for manufacturing industries based on the three aspects of economic, environment and social. IMS' key economic indicators for manufacturing industry are:

- Profit
- Employee benefit
- Added value from employee
- Intangible asset via innovation improvement
- Supply chain benefit

According to Bebbington and Macgregor [65], the major measurement for economic aspects is revenue and value added pertaining to each stakeholder which comprises of tax, remuneration/employee benefit, social capital/infrastructure investment and business opportunity. In short, revenue is playing a key role in measuring economic sustainable measurement which is supported by other researchers Cavanagh *et al.* [66].

**Environment:** In terms of environmental sustainable measurement, Székely and Knirsch [61] have pinpointed the following measurements:

- Resource productivity: sales per unit of energy consumption, sales per unit of material input
- Process eco-efficiency: production unit per unit of waste, net sales per unit of greenhouse gas emissions in tons of CO<sub>2</sub> equivalent
- Functional eco-efficiency of products or services: fuel efficiency of a plane/car
- Emission intensity: tons of CO<sub>2</sub> emissions per unit of electricity generated
- Waste intensity: amount of waste per production volume
- Resource intensity: energy consumption per function, material input per service
- Losses: non-product output per materials input
- Recycling percentages
- Fractions: percentage of renewable energy, fraction of recycled materials, fraction of hazardous waste

They also clearly reveal key environmental measurements for technology companies in Germany. These leading companies are not only leading in their home country, Germany, but also are the prestigious leaders in the electronic and electrical industry globally, particularly sustainable reporting practice. Hence sustainable performance measurement developed by these leading companies act as key benchmarks and references for other companies, particularly in the electronic and electrical industry.

- BASF: emissions of greenhouse gases(1000metric tons), reduction of greenhouse gas emissions, emissions to water, reduction of emissions to water
- Henkel: energy consumption in 1000mWhas percentage of production volume, emissions of greenhouse gases(1000metric tons) and percentage of production volume, dust emissions (metric tons)and percentage of production volume, emissions of volatile organic compounds in metric tons and percentage of production volume, water consumption and volume of wastewater, Chemical oxygen demand (COD) and heavy metal emissions to water,waste for recycling and disposal in 1000metric tons, complaints from neighbours
- Robert Bosch: energy consumption (GWh),CO2 emissions (in 1000 m3),water consumption (mill m3),wastewater (mill m3), waste (mill tons3), environmental protection costs and investment, additional input/output balance
- Siemens: energy consumption (GWh), CO2 emissions (tons), water consumption (mill m3 and l/E), wastewater (mill m3),waste (tons and t/E), business travel (total km), environmental protections pending (total and per employee)

Meanwhile, IMS [64] pinpoints the following environment indicators which are intimately comparable to previous research:

- Non-renewable resource productivity: percentagescrap in comparison to material used, percentagereused component per product, percentagerecycled material
- Renewable resource productivity: energy reuse, energy recycling
- Waste management/intensity: kg waste per product produce, scarp per product
- Pollutions/emission intensity: tons of CO2 emissions per unit of electricity generated

- High tech versus low tech on sustainability
- Investment in awareness of environmental sustainability: training and courses, rules and regulation.

The study of Henri and Journeault [67] on the environmental performance measurements of 1,500 Canadian manufacturing firms also reveals the equivalent measurements as Székely and Knirsch[61] and IMS [64]. This measurement includes emissions of substance per volume of production or per unit of value added, emissions and waste data in terms of their capacity to cause environmental damage, energy and services, operation of facilities and equipment and logistics and total output of products, services, waste and emissions.

In the Malaysian manufacturing context, Jafartayari[68] studied the awareness of sustainable manufacturing practice, sighted Jawahir *et al.* [69] unveiling six important areas in term of sustainable measurement on the manufacturing product including reduce, reuse, recycle, recover, redesign and remanufacture. Those measurements are evolved from the traditional 3Rs of reducing resources, reusing materials and recycling waste and residual.

Generally, Hubbard [55] added that key material usage/production unit, energy usage/production unit, water usage/production unit, emission or waste/production unit should be the major components of environment measurement.

**Social:** In terms of social aspects, the following measurements were proposed by Székely and Knirsch [61]:

- Labour/employment issues: standard issues such as health and safety, education, training, industrial relations, wages, benefits, conditions of work/employment, accountability, image/reputation and harassment
- labour productivity:turnover per employee
- quotas: percentage of women in upper management
- Supplier relationships: contractual agreements with suppliers, supplier diversity and company policies on the screening of suppliers
- Community initiatives: involvement in local communities, contribution to the local economy, ensuring local wealth and skills
- Corporate philanthropy: donations, pre-tax profits and grant programmes.

In conjunction with this, key social measurements for leading electronic and electrical companies in Germany are as follows

- BASF: lost time accidents, workforce profile, donations and sponsoring
- Henkel: no. of employees, accidents per 200,000 hours worked, participation in employee training programmes, no. of employee projects (MIT)
- Robert Bosch: employee total number, years of service in company, accident rate
- Siemens: employee total number, proportion of women (total and top management), personnel cost total, number of apprentices, donations.

In the meantime, IMS [64] pinpoints the below social measurements which are consistently equivalent to above researchers and initiated from GRI

- Human resources: job creation, job satisfaction, accident cost, leave per years, training and course, increment in education and training

- labour productivity: turnover per employee, staff count per unit of profit
- Supplier relationships: contractual agreements with suppliers, supplier diversity and company policies on the screening of suppliers

Bebbington and Macgregor [65] highlight two main areas concerned: impact of employment and attribution to society. Basically, impact on employment results from both positive and negative aspects: the positive aspects include job creation and direct and indirect benefit employees gain, whereas negative impact covers accidents, death and turnover. In addition, Hubbard [55] added social measurement should comprise the satisfaction of employees, customers, suppliers and the community in general.

In a nutshell, with the sound references from the above literature review, Global Reporting Initiative (GRI) [70], Sustainability [71], Sustainable Value [72] and Asian Sustainability Rating [37], this conception paper will lay out the framework of a sustainable performance measurements (SPMs) model for the Malaysian electronic and electrical industry as follows:

A proposed framework of sustainable performance measurements (SPMs) model for the Malaysian electronic and electrical industry

Economic	Environment	Social
I) Revenue	a. Non-renewable resource productivity:	i) health and safety
a. Impacts on shareholder:	i) sales per unit of non-renewable energy consumption	ii) education and training
i) net profit	ii) sales per unit of non-renewable material input	b. Labour productivity:
ii) return on capital deployed	b. Renewable resource productivity:	i) turnover per employee
iii) earnings per share	i) sales per unit of renewable energy consumption	ii) average year of services
b. Impacts on employees:	ii) sales per unit of renewable material input	iii) staff cost per unit profit
i) remuneration	c. Recycle:	c. Quotas:
ii) benefits	i) percentage reused component per product	i) percentage of women in upper management
c. Impacts on governments:	ii) percentage recycled material	ii) staff profile according to race
i) taxes	iii) percentage energy reuse	d. Customer satisfaction:
ii) tax breaks	d. Waste management/intensity:	i) market share
iii) subsidies	i) kg waste per product	ii) compliant from customer
References:	ii) scrap per product	e. Community initiatives:
[37, 61, 64, 65, 66, 70, 71, 72]	e. Pollution/emission intensity:	i) involvement in local communities
	I) tons of CO <sub>2</sub> emissions per unit of unit of sale	ii) donations and grant programmes
	ii) tons of CO <sub>2</sub> emissions per unit of electricity	References:
	f. Investment on awareness on environmental sustainability:	[37, 55, 61, 64, 65, 70, 71, 72]
	I) training and course	
	ii) rule and regulation	
	References:	
	[37, 55, 61, 64, 67, 68, 69, 70, 71, 72]	

**Steps Forward:** In order to validate the above framework of sustainable performance measurements (SPMs) model for the Malaysian electronic and electrical industry, the following steps will be carried out:

- A questionnaire survey of all Malaysian electronic and electrical firms under a combined database of Electrical and Electronics Association of Malaysia (TEEAM) and The Federation of Malaysian Manufacturers (FMM);
- The data collected for this study were analysed quantitatively using a structural equation model program: Statistical Package of Social Sciences (SPSS), Amos 18.

TEEAM is a representative body of the electronics and electrical industries in Malaysia that was established in 1952. TEEAM is the government-appointed agency overseeing the promotion of electronics and electrical industries of the Malaysian economy. Its aim is to work with all government departments, statutory bodies and the private sector to ensure and promote orderly growth and development of the electronics and electrical industries. To date, TEEAM has approximately 1,600 members and its members are classified under the three groups, according to their business activities: engineering construction and services group, trading group and manufacturing group. Only companies engaging in manufacturing activities will be selected for this study.

The Federation of Malaysian Manufacturers (FMM) is Malaysia's premier economic organisation. Since its establishment on 2nd July 1968, the FMM has consistently led Malaysian manufacturers in spearheading the nation's growth and modernisation. FMM is also committed to the realisation of Vision 2020 and will lead Malaysian industries to higher levels of productivity and international competitiveness. Today, as the largest private sector economic organisation in Malaysia representing over 2,000 manufacturing and industrial service companies of varying sizes, the FMM is the officially recognised and acknowledged voice of the industry. Its members represent 23% of the 861 companies listed in Bursa Malaysia. Of the 2,135 FMM members companies, 47% of the companies have already obtained their International Organization for Standardization (ISO) certification.

After cross-checking both databases and eliminating duplicates a single database was created containing the whole population of electronics and electrical

manufacturing companies registered with TEEAM and FMM in Malaysia. A random sampling technique will be applied to obtain the study sample. As such, the population database will be divided into three categories according to the company's size: large, medium and small, based on the classification by the Ministry of International Trade Industry (MITI) of Malaysia. Subsequently a random sampling technique will be applied across these three categories.

Basically, there will be two major techniques involved in the structural equation model programme for this study: exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). According to Hiar *et al.* [73], EFA is carried out before CFA to provide a preliminary check on the number of factors and pattern loadings or which variables belong to which constructs. CFA is a way of testing how well measured variables represent a smaller number of constructs. They added that one of the biggest advantages of CFA is its ability to assess the construct validity of a proposed measurement theory.

## CONCLUSION

This conception paper unveils a framework of an SPMs model for the Malaysian electronic and electrical industry. Such findings will definitely break through the knowledge frontier particularly in terms of sustainable performance measurement among the Malaysian electronic and electrical industry. As stated earlier, in Malaysia, sustainability performance reporting is still in its infancy phase and is subject to plenty of uncertain issues, particularly on sustainable performance measurements models (SPMs) that need to be managed, measured and reported on [7, 38, 39, 40, 41, 42]. Hence this paper is expected to be the useful reference for companies and regulators, particularly those that shy away from sustainable performance measurement [39, 41, 43, 52].

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