

THE DEVELOPMENT OF GREEN MANAGEMENT AND GREEN TECHNOLOGY IN GREEN MANUFACTURING IN MALAYSIA

Mohd Yazid Md Taib¹
Zulkifli Mohamed Udin²
Abdullah Abdul Ghani³

^{1,2}*School of Technology Management and Logistics, Universiti Utara Malaysia, Kedah*
³*Islamic Business Studies, Universiti Utara Malaysia, Kedah, Malaysia*

ABSTRACT

The purpose of this conceptual paper is to look into the development of green management and technology towards business sustainability. The concept of relationship between green management and technology towards business sustainability is explored. Several important items are focused upon including the role of green management, technology and business sustainability as fundamental factors and their correlation. Theoretically this paper aims to fill the gap on an area of green management, technology and business sustainability which has been rarely touched upon. The definition of the green manufacturing, measurement for the implementation and practice as well as the emergence and its importance is discussed below. The paper contained herein has a strong implication for Malaysian business and also to other countries of the world. It is highly expected that leaders from top to floor level in business organizations will adapt and apply for successfully managing green, technology of green towards sustaining business. The whole function in the organization from the top, middle and lower floor members inclusive of supporting groups such as procurement, material handler, quality and engineering must perform a team effort for making the green management and technology a successful business sustainability.

Keywords: *Green management, green technology, green manufacturing*

INTRODUCTION

Most of the industrial nation has taken a drastic action to preserve the environment from pollution due to industrial activities (Watts & Noh, 2014). As for the Malaysian perspective, as indicated by Mahmood et al. (2013), under the Environmental Quality Act (EQA) of 1974, The Department of the Environment (DOE), is empowered to prevent and control pollution and to enhance and protect the environmental quality. Continuous growth of human population, increased industrialization for supplying necessary products and rapid economic growth in developing countries around the globe has resulted in an extensive demand for renewable energy. A variety of global socio-environmental problems require for a drastic reduction of fossil fuel consumption.

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As a result, the promotion of green management and technologies providing newer techniques for preserving environment while keeping business operations sustainable has become imperative. Furthermore, the establishment of the Ministry of Energy, Green Technology and Water (KeTTHA) in 2009 in Malaysia illustrates the nation's intention to indoctrinate the message of 'clean and green' as the practical way forward towards creating an economy based on sustainability.

STATEMENT OF THE PROBLEM

Nowadays, all manufacturing around the globe is implementing various concepts, practices and introduce performances measurement to become environmentally sustainable (Zhu, Sarkis, & Geng, 2005). Additionally the business manufacturing is going forward for eco-design and investment recovery (Zhu, Geng, Fujita, & Hashimoto, 2010), high profits by having green products and green supply chain in manufacturing (Soylu & Dumville, 2011). The external factors which plays important role in the green manufacturing were due to regulatory and legislation by the government, strong competition with the competitors and market pressure. Business community often complaining of massive cost involve in going 'green' and the significant impact towards the overall performance. Anyhow, if the businesses do not transform voluntarily the sooner they will be forced in this direction by government, non-governmental group, customers and public (Kane, 2011).

The planet earth is getting old so do the natural resources is depleting. World community in various fields must decisively coordinate all preserving activities in sustaining the resources so those new babies will inhabit and enjoy the quality of life like us. Historically, the environmental, green management awareness and related activities emerge from the wrongdoings, selfish and wasteful by human behaviour (Haden, Oyler, & Humphreys, 2009). Anderson (2004) explained broadly that the most severe damage to the environmental and wasteful behaviour in history was originated within the era of Industrial Revolution. In fact, our environment was overwhelmingly critical in environmental destruction of landslide, famine, flooding and corrosion due to the man was blinded by wealth during the Industrial Revolution (Hobsbawn, 1969). Nearly a decade ago restoration organizations are now committed for reinvesting in natural capital, preserving the biosphere and ameliorating the nature of the world (Anderson, 2004).

LITERATURE REVIEW

The Emergence of Green Manufacturing

In Malaysian manufacturing environment, there are on-going issues need to be overcome including the main factors as business culture, design operation, waste handling (Oh, Pang, & Chua, 2010). Due to extensive 'industrial nation' during the premiership of Tun Mahathir Mohammed (1982 – 2006), Malaysia has emerged as an export nation of electrical and electronics products particularly in Asia (Malaysian Investment

Development Authority, 2013). On the other hand, the control of pollution and hazardous chemicals started to become serious causing damaged to the industrial surrounding area (Ghani, 2013). Kung, Huang, and Cheng (2012), defined green manufacturing as “a decrease in the wastages associated with energy and raw material's consumption, as well as decrease the pollution and wastages throughout a manufacturing process.” About 30 per cent of total global omissions are coming from manufacturing (Kane, 2011) and most countries in Europe, Asia, South America and now extending to middle-east in fossil based energy. It is utmost importance for manufacturers to greening their operations from green material's usage, delivery to the plant/facilities, productions' assembly, delivery to distributors and end customer, marketing and procurement. Actually, the most environmental destruction industry tends to start to exist early in the chain, for example in the primary industries: fisheries, farming, forestry, mining and oil production. However green manufacturing clearly has a huge impact to the environment as well as presented in the figure below (Kane, 2011).

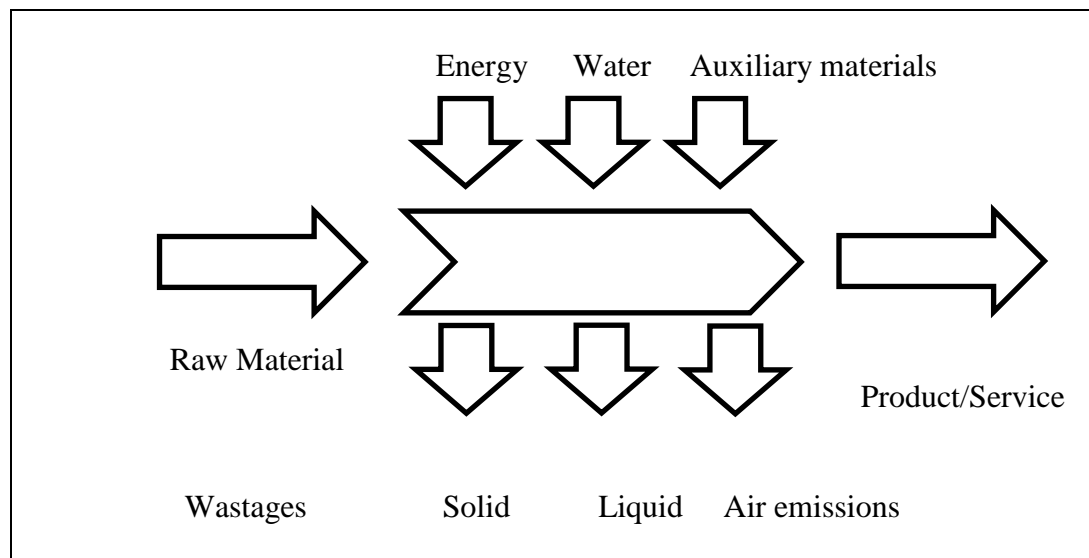


Figure 1
Manufacturing impact on the environment (Kane, 2011)

Kane (2011) has identified in Figure 1, the main wastages from the manufacturing of solid, liquid and air emissions which will pollute the environment if carelessly taken care. The manufacturing organizations need to measure the action taken by mobilizing the whole elements under its authority.

Green Management

Nowadays, green management concept is widely used and implemented with the purpose of increasing sales, winning governmental approval and acceptance by the society. We do not really know whether the so-called green manufacturing really follows the blue print and practice it. There are numerous terms been used such as green woman entrepreneurs (Braun, 2010), green supply chain (Mahmood *et al.*, 2013; Wu, 2013),

green product (Siew, 2013), green loyalty (Chen, 2013), green building (Barnes, 2012), green purchasing (Chen & Chang, 2012), green IT (Bose & Luo, 2012; Harmon, Demirkan, & Raffo, 2012), green industry (Saxena & Khandelwal, 2012), green community (Xie & Breen, 2012), green logistics (Lai & Wong, 2012) and endless green. All the positive attitude of ‘greening’ are intended to qualify for the cost cutting which in line with the profit increments or a deep concern for the environmental protection and the welfare of the community by adopting the green practices in the organization.

Green Technology

What is technology?

The UN Conference on Trade and Development (UNCTAD) has coined the following definition:

“Technology is bought and sold as capital goods including machinery and productive systems, human labor usually skilled manpower, management and specialized scientists. Information of both technical and commercial characters, include that which is readily available, and that subject to proprietary rights and restrictions”.

Particularly in Malaysia with the increasing growth in economy, going forward for industrialization and population increasing requires a tremendous huge demand for renewable energy since the global environmental issues calling for the stoppage on fossil fuel (Abu Bakar, Mohd Sam, Tahir, Rajian, & Musían, 2011). Li-Hua and Khalil (2006) pointed that management of technology (MOT) played a role of strategic tools for competitiveness improvement and create a path of prosperity for countries applies it.

Green Manufacturing Measurement

It is urgently in need to identify the measuring elements for the so-called green manufacturing. Digalwar, Tagalpallear, and Sunnapwar (2013) identified the empirical measurement for green manufacturing as in the Table 1 below:

Table 1		
Green Manufacturing Measurement		
No	Measurement	Explanation
1	Commitment by Top Management	Top management acted like a framework for the improvement of environmental; determine the policies, set up training and communication.
2	Knowledge Management	To make knowledgeable recommendations and interpretations for supporting the green activities to stakeholders.
3	Training of employee	A well-trained human resource required to follow-up with a diverting regulatory and to fulfill the green goal.
4	Green process and product design	Designers got to look at the toxicity, source, and of raw materials; the resources and energy required manufacturing the product; and how the product can be recycled or reused at the end of its life in the design for environment process

5	Employee engagement	Employees' participations are committed and motivated in environmental practices.
6	Safety, health and environmental	A regular audit should perform on employee safety and health and promotion on green.
7	Materials and supplier management	Materials and supplier management is the coordination and managing a complex network of activities related in delivering a finished product to the end-user. It is a vital business process and function which includes sourcing parts, raw materials, manufacturing, product assembly, order entry, storage, tracking and distribution via various channels and finally customer delivery.
8	Production control and planning	Environmental health manager and Operation managers are suggested to play a major role in the development of environmental management system (EMS); i.e. introducing 'cleaner technologies'.
9	Quality	Quality performance is focusing on reducing the non-conforming products and analyzing the root causes of non-conforming products discovered by a customer.
10	Cost	The competitive advantage will be achieved by the organization if able to develop an overall cost without neglecting quality and service.
11	Customer environmental requirement	Social environmental obligation is a important management function and appears to be vital for the success in business and manufacturing
12	Customer responsiveness and growth	Corporate reputation will be tarnished on environmental issues which affect consumers' perceptions and competitive advantage.

Green Manufacturing Opportunities

There is significant impact on the business performance in competitive advantage and prosper the business sustainability. Additionally, the practices of green manufacturing and green technology has created a new business in an area of green supply and demand throughout companies in Malaysia (Abu Bakar *et al.*, 2011).

"Zainura, (2010) said: The future of technology is most definitely green. With rising energy costs and the threat of global warming, many businesses are now recognizing the benefits of using technology to reduce their carbon footprint and to minimize waste, while having a positive impact on their business".

"Global warming is the largest economic opportunity of the 21st century according to John, (2009)"

Abu Bakar *et al.* (2011) have identified six green technology business success factor(BSF) for green manufacturing entrepreneurs in Malaysia to explore such as green

energy, green chemistry and green nanotechnology.

SUMMARY

Green manufacturing is becoming an important concept and practical process orientation throughout the organization. Many benefits gain by adopting green manufacturing besides profit and increase market share; green manufacturing will enhance customer loyalty, fulfil the society requirement, environmental sustainability and increase the competitive advantages. The whole player consists of external parties such as suppliers, transporters; internal parties involving all direct and indirect support departments in manufacturing facility; shipping agents will perform their respective tasks based on the method of 'green'. The key success will go back to human resources since they are the executor. It is not a lip-synching service or saving face but commitment towards the implementations and continuous improvement. Leaders are great motivator behind the success of green management.

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