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The Collaboration of Green Design & Technology towards Business Sustainability in Malaysian Manufacturing Industry

Mohd Yazid Md Taib ^{a*}, Zulkifli Mohamed Udin^b, Abdullah Hj Abdul Ghani^c

^{a,b} School of Technology Management and Logistics, Universiti Utara Malaysia, 06010 Kedah, Malaysia

^c Islamic Business School, Universiti Utara Malaysia, 06010 Kedah, Malaysia

Abstract

At present, global businesses are operating in a hyper competitive scenario in which supremacy is incontestably a fulcrum in sustainability. In achieving this, businesses require a systematic and comprehensive management in a superior way to overcome the huge competitive circumstances faced by globalizes milieu. Logically, by implementing the green management which intertwined, co-formulated and co-implemented with the technology are enabling the businesses particularly in manufacturing to retain the sustainability status quo and outperformed the rivals. Specifically, in Malaysia's manufacturing accentuates the necessity of fulfillment the drivers of green management and technology in sustaining business. Accordingly, at the end the implications of these conceptual collaborations are presented for practitioners and researchers.

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1. Introduction

In the 21st century, the face of business competition has changed tremendously. The business sustainable maneuverability unprecedentedly is very challenging due to the competitive forces becoming hyper competitive and furious.

* Corresponding author. Tel.: +6019-4156780; fax: +604-9286860.

E-mail address: yazidtaib105@yahoo.com

Simultaneously this will lead the business in the verge of collapse not likely only resulting in the best disparity or competitive disadvantage. In fact business nowadays, in the third millennium have an association with business internalization, economic uncertainty, unreliable macro-environmental changes, technological evolution design and information.

This phenomena has forced business to adopt a holistic proactive role in implementing green management and development of technology (Digalwar, Tagalpallewar, & Sunnapwar, 2013; Soylu & Dumville, 2011), particularly for environmentally cleaner business in manufacturing processes and designing of recyclable products.

So, first and foremost, collaboration, green, technology, green design and business sustainability as the five constructs must be extensively defined.

2. The Five Constructs

The construct of both green management and technology must co-exist in ensuring the successive of business sustainability.

2.1 Collaboration

According to Merriam-Webster dictionary, collaboration is an act of work together with other person or a group of people or firms with firms to create or produce. It is a method of sharing expertise with the purpose of restructuring and outpace the competitors, e.g.: Redesigning Nissan when Carlos Ghosn of Peugeot takes charge (Hughes, Barsoux, & Manzoni, 2003).

2.2 Green

Haden, Oyler, and Humphreys (2009) mentioned, the exploratory approach of green is *“the organization-wide process of applying innovation to achieve sustainability, waste reduction, social responsibility and a competitive advantage via continuous learning and development and by embracing environmental goals and strategies”*.

Lee (2009) supported that green management involving the complete functions in an organizations to change such as competitive advantage, human resources, cost savings, innovation capability and structure.

2.3 Technology Management

A process of a continuing journey in new technology implementation, a culture which drives an organization to maintain and enhance their market ranking through the use of appropriate technology (Harrison & Samson, 2006; Li-Hua & Lu, 2013). It is a parallel existence with green management since green implementation requires new technology such as solar energy, hybrid engine and wireless cable to achieve green management objectives. .

2.4 Green Design

Manufacturers are designing the finished products as being able to be recycled and dissembled at the end of life span (Dowie, 1994). A new approach which manufacturers must focus is to remain competitive rather than encouraging consumption.

2.5 Business Sustainability

The business organization's adaption and implementation in green management and investment is crucial in novel technology in achieving a competitive advantage thus being sustainable. According to (Lee, 2009), (Urban & Naidoo, 2012) defined business sustainability as a practise *“to fulfill the required necessity of the present without compromising the ability of future generations to meet their own needs”*.

3. Green Design

It is a collaboration activity within the businesses from the top green management in managing the human resource, facility, machine investment and training (Abu Bakar, Mohd Sam, Tahir, Rajian, & Musían, 2011). The technical experts in handling the machines and design team in the early stage of designing the products are sharing the common objectives of assembling and disassembling knowledge.

3.1 Green Design Process

When dealing with products which about to reach the end of life cycle, 3Rs is important as shown in Fig. 1 as adopted from Dowie (1994) and the priority of importance of reuse, remanufacture and recycle.

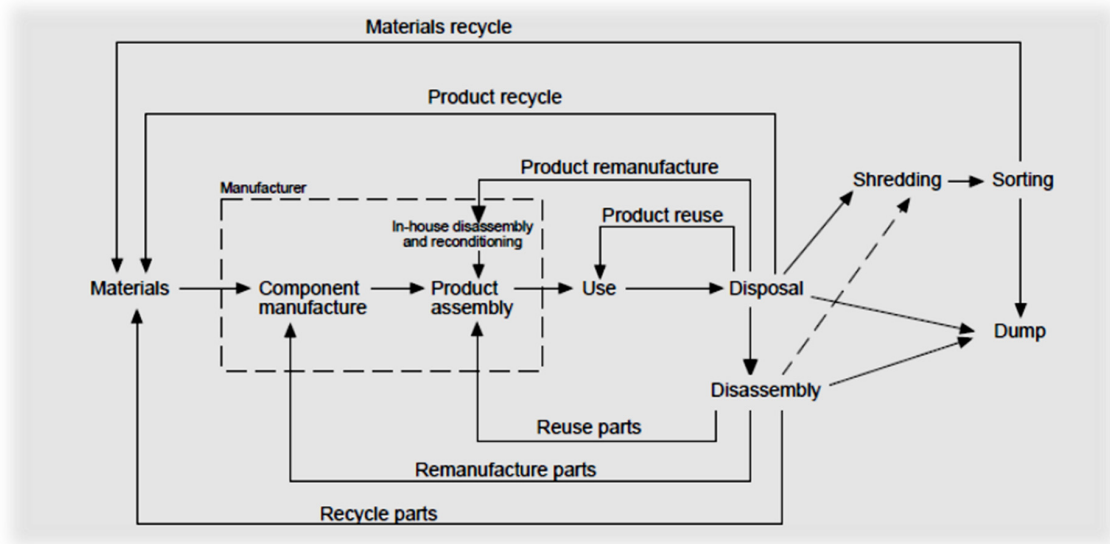


Fig. 1. 3Rs Distinguishing Products from Parts

The above activities significantly played a major role in sustaining the globe's resources. Actually, there are 6 methods of dealing with products upon reaching the life end:

- (1) The product will be dumped if it has no materials or recyclable parts.
- (2) The product will be recycled if some small amount of recyclable materials are able to be sorted and shredded.
- (3) If the products are able to be reused, remanufactured and recycled, it is subjected for disassembly.

There are usually four (4) possible outputs during the disassembly process.

- Reusable parts will be removed from the products, return to the manufacturer for recondition and assemble to the new products.
- Some other parts will be returned to the manufacturer for remanufacture for next assembly.
- Parts which are having substantial quantities of recyclable materials will directly proceed for recycling materials.
- Shredding and resulting materials will be sorted is the most appropriate for the parts which contain small quantity of recyclable materials.

- (4) If the product is still functioning, it is still usable; it can be sold in the secondhand market.
- (5) In some cases, manufacturers may recall products which about to end the life span for remanufacture such as photocopier companies then the machine either re-sells or lease.
- (6) For the whole product if made from recyclable materials, will proceed for materials recycling.

3.2 Important Consideration

Manufacturers must consider the ability to disassemble parts from the products when recycling, remanufacturing and servicing which is in line with Manchester Metropolitan University, UK which suggested for designing products which is easier for disassembly and remanufacture (Dowie, 1994). Typically, the research examined including vacuum cleaners, telephones, photocopiers and computer monitors. Various important considerations as below:

- A complete process of disassembling products as to recover parts, fasteners and materials.
- It has to be feasible in commercial value to perform a complete disassemble.
- The values recovered from the recycle parts may lower from the cost of disassemble.
- The recycling markets for some materials are limited and not worth of removing the parts from the materials.

Manufacturer also needs to monitor a point along the disassembly process as shown in Fig. 2 as adopted from Dowie (1994) where the recoverable value reaches a maximum. There will be more materials and reusable parts but it is useless effort without any value if the disassembling process beyond this point. As for purely economic gains then the disassembly processes should stop immediately.

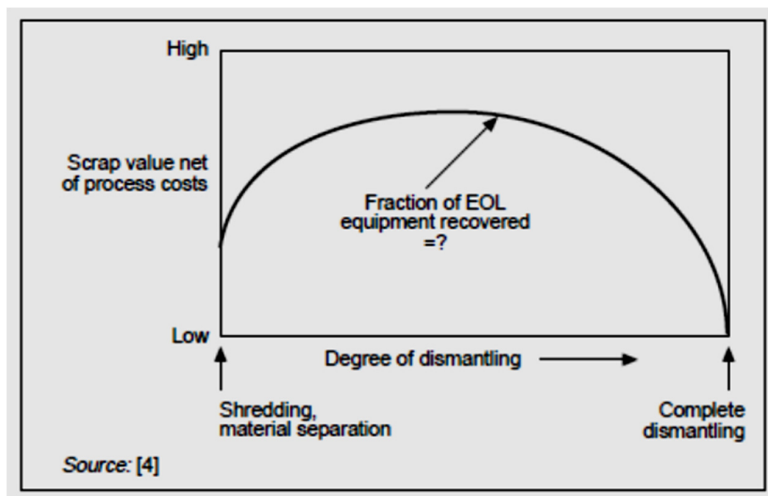


Fig. 2. The Degree of Disassembly versus Scrap Value

4. Green Practices in Business and Manufacturing

The green practices has been spread throughout the organizations internally as well as the stakeholders such as in raw materials, productions, engineering and other related departments which includes supplier and customer (Watts & Noh, 2014). In the area of information technology(Bose & Luo, 2012), telecommunication (Wang, Vasilakos, Chen, Liu, & Kwon, 2011), logistics (Lau, 2011), building for social benefits (Zhou, 2012), automotive shape design based on neural networks (Fan, Chiu, & Yang, 2014).

5. Green Design & Manufacture Framework

The overall activities are falling within the green management & green technology inclusive of green design and manufacturing as shown in the fig. 3.

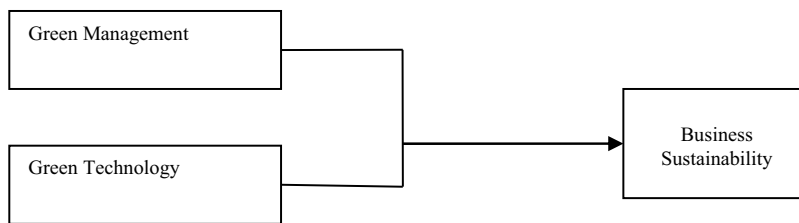


Fig. 3. Proposed Framework

The above proposed framework which consist of three major variables is supplementing each other towards higher performance in achieving sustainable profit and leader in the market (Gollnow, 2014). The implementation of International Standardization of Organization (ISO) on the documentations for quality management system (QMS) and environmental management system (EMS) internally are playing an important role in business sustainability. Additionally, the government policies and market pressure as well as society plays as an outsider which lead the business organization to achieve the business sustainability (Gimenez & Sierra, 2012; Reilly & Weirup, 2012).

Other area of manufacturing and services are also adopting the green management, technology and design such as marketing in shaping the purchase behavior (Maheshwari & Malhotra, 2011), purchasing intentions in manufacturing and services (Chen & Chang, 2012). It is indeed the aggressive development of green supply chain management has become a prime agenda (Laosirihongthong, Adebajo, & Tan, 2013; Mahmood *et al.*, 2013; Zhu, Geng, Fujita, & Hashimoto, 2010).

6- Summary

In most manufacturing, the processes are lively on daily basis. Customer satisfaction is utmost priority as means for survival and the operating cost is very crucial. Market, society and legislation requirement need to be fulfilled. By adapting to green design & technology, businesses are gearing towards sustainability which enhances the competitive advantage. The introduction of spiritual leadership as moderator is likely recommended to strengthen the implementation of green management and technology towards business sustainability.

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References

- Abu Bakar, K., Mohd Sam, M. F., Tahir, M. N. H., Rajian, I., & Musian, N. (2011). Green Technology Compliance In Malaysia For Sustainable Business Development. *JOURNAL OF GLOBAL MANAGEMENT*, 2(1).
- Bose, R., & Luo, X. R. (2012). Green IT adoption: a process management approach. *International Journal of Accounting and Information Management*, 20(1), 63-77. doi: 10.1108/18347641211201081
- Chen, Y.-S., & Chang, C.-H. (2012). Enhance green purchase intentions: The roles of green perceived value, green perceived risk, and green trust. *Management Decision*, 50(3), 502-520. doi: 10.1108/00251741211216250
- Dowie, T. (1994). Green Design. *World Class Design to Manufacture*, 1(3), 15-22. doi: 10.118/09642369210063045
- Fan, K.-K., Chiu, C.-H., & Yang, C.-C. (2014). Green Technology Automotive Shape Design Based On Neural Networks And Support Vector Regression. *Emerald Insight*, 31(8), 1732 - 1745. doi: 10.1108/EC-11-2012-0294

- Gimenez, C., & Sierra, V. (2012). Sustainable Supply Chains: Governance Mechanisms to Greening Suppliers. *Journal of Business Ethics*, 116(1), 189-203. doi: 10.1007/s10551-012-1458-4
- Gollnow, H. R. (2014). *Factors Influencing The Adoption Of Green It Practices By Decision-Making It Managers*. (Doctor of Philosophy), Capella University, USA, Ann Arbor, Michigan, USA.
- Haden, S. S. P., Oyler, J. D., & Humphreys, J. H. (2009). Historical, practical, and theoretical perspectives on green management: An exploratory analysis. *Management Decision*, 47(7), 1041-1055. doi: 10.1108/00251740910978287
- Harrison, N., & Samson, D. (2006). *Technology Management: Text and International Cases*. New York, USA: McGraw-Hill.
- Hughes, K., Barsoux, J. L., & Manzoni, J.-F. (2003). Redesigning Nissan (A): Carlos Ghosn Takes Charge.
- Laosirihongthong, T., Adebanjo, D., & Tan, K. C. (2013). Green supply chain management practices and performance. *Industrial Management & Data Systems*, 113(8), 1088-1109. doi: 10.1108/imds-04-2013-0164
- Lau, K. H. (2011). Benchmarking green logistics performance with a composite index. *Benchmarking: An International Journal*, 18(6), 873-896. doi: 10.1108/14635771111180743
- Lee, K.-H. (2009). Why and how to adopt green management into business organizations?: The case study of Korean SMEs in manufacturing industry. *Management Decision*, 47(7), 1101-1121. doi: 10.1108/00251740910978322
- Li-Hua, R., & Lu, L. (2013). Technology strategy and sustainability of business: Empirical experiences from Chinese cases. *Journal of Technology Management in China*, 8(2), 62-82. doi: 10.1108/jtmc-05-2013-0024
- Maheshwari, A., & Malhotra, G. (2011). Green Marketing: A Study On Indian Youth. *International Journal of Management and Strategy*, 2.
- Mahmood, W. H. W., Rahman, M. N. A., Deros, B. M., Jusoff, K., Adi Saptari, Z. E., Sultan, A. A. M., . . . Jano, Z. (2013). Manufacturing Performance in Green Supply Chain Management. *World Applied Sciences Journal 21(Special Issue of Engineering and Technology)*. doi: 10.5829/idosi.wasj.2013.21.1010
- Reilly, A., & Weirup, A. (2012). Sustainability initiatives, social media activity, and organizational culture: An exploratory study. *Journal of Sustainability and Green Business*, 1, 1-15.
- Urban, B., & Naidoo, R. (2012). Business sustainability: empirical evidence on operational skills in SMEs in South Africa. *Journal of Small Business and Enterprise Development*, 19(1), 146-163. doi: 10.1108/14626001211196451
- Wang, X., Vasilakos, A. V., Chen, M., Liu, Y., & Kwon, T. T. (2011). A Survey of Green Mobile Networks: Opportunities and Challenges. *Mobile Networks and Applications*, 17(1), 4-20. doi: 10.1007/s11036-011-0316-4
- Watts, S., & Noh, J. (2014). Going Green With Management - Management Technology Comparison Within Green Companies: China, USA And Korea. *International Journal of e-Education, e-Business, e-Management and e-Learning*, 4(3), 160-165. doi: 10.7763/IJEEEE.2014.V4.323
- Zhou, X. (2012). Social benefits of urban green space: A conceptual framework of valuation and accessibility measurements. *Management of Environmental Quality: An International Journal*, 23(2), 173-189. doi: 10.1108/14777831211204921
- Zhu, Q., Geng, Y., Fujita, T., & Hashimoto, S. (2010). Green supply chain management in leading manufacturers: Case studies in Japanese large companies. *Management Research Review*, 33(4), 380-392. doi: 10.1108/01409171011030471