

## MODERATING ROLE OF PERCEIVED BENEFIT BETWEEN SUSTAINABLE ENVIRONMENTAL MANUFACTURING PRACTICES AND FIRM PERFORMANCE

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### Abstract

The need to maintain a balance between the developmental and environmental issues in manufacturing firms is required to ensure that the cost of environmental changes does not negate the economic benefits perceived by the firms. Therefore, this study investigated the effect of sustainable environmental manufacturing practices on firm performance via the moderating effect of perceived benefits. The study used a survey questionnaire which was posted to the operation, manufacturing manager and the environmental, health and safety manager to collect 103 data from the Malaysian manufacturing firms. The data collected was analyzed with smartPLS 2. M3. The study found that sustainable environmental manufacturing practices significantly influence environmental performance, while perceived benefits moderates between sustainable environmental manufacturing practices and operational performance. The study has revealed the understanding of the scenario of sustainable manufacturing practices in a developing country as yet to be considered as a strategic factor. Therefore, it is suggested that more awareness should be created to enlighten the manufacturing practitioners not only to perceive sustainable environmental practices as ethical, but also as a strategic factor to enhance achieving better firm performance.

Keywords: Sustainable environmental manufacturing practices, firm performance, perceived benefits

### Abstrak

Keperluan untuk mengekalkan keseimbangan di antara isu-isu pembangunan dan alam sekitar dalam firma-firma perkilangan amat diperlukan untuk memastikan bahawa kos perubahan persekitaran tidak menafikan manfaat ekonomi oleh firma-firma ini. Oleh itu, kajian ini menyiasat kesan amalan pembuatan mampan alam sekitar kepada prestasi firma melalui kesan menyederhanakan manfaat teranggar. Kajian ini menggunakan soal kaji selidik yang telah dihantar kepada pengurus operasi dan pembuatan, serta pengurus alam sekitar, kesihatan dan keselamatan. Sebanyak 103 data telah dikumpul dari firma-firma pembuatan Malaysia. Data yang dikumpulkan dianalisis dengan smartPLS 2. M3. Kajian mendapati bahawa amalan pembuatan mampan alam sekitar secara signifikan mempengaruhi prestasi alam sekitar, manakala manfaat teranggar menyederhanakan amalan pembuatan mampan alam sekitar dan prestasi operasi. Kajian ini telah mendedahkan pemahaman tentang senario amalan perkilangan yang mampan di negara membangun yang belum menganggap ia sebagai satu faktor strategik. Oleh itu, dicadangkan bahawa kesedaran harus dibuat untuk menyedarkan pengamal perkilangan bukan sahaja untuk melihat amalan alam sekitar yang mampan sebagai etika, tetapi juga sebagai satu strategik faktor meningkatkan mencapai prestasi yang lebih kukuh.

Kata kunci: Amalan pembuatan mampan alam sekitar, prestasi firma, manfaat teranggar

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## 1.0 INTRODUCTION

Environmental issues arose as a result of the activities of manufacturing firms to achieve economic growth. Thus, the need to maintain a balance between the

developmental and environmental issues in manufacturing firms is required to ensure that the cost of environmental changes does not negate the economic benefits perceived by the firms and environmental policy makers through enactments,

law and policies [1], [2]. Hence, implementing environmental sustainable practices of the manufacturing companies is needed to reduce the traditional association that exists between manufacturing firms and the undesirable environmental negative impacts [3].

Sustainable manufacturing is the initiatives of creating manufactured products by using processes that minimize the negative environmental impacts, conserve energy and natural resources by providing a safe and economically sound environment for employees, communities and consumers [4]. It is regarded as the management of the operations and resources of firm to conserve and avoid the destruction of the environment [5]. According to [6], it is the techniques, policies and the procedures taken by a firm with the specific aim of monitoring and controlling the effects of the operations of the firm on the natural environment.

Sustainable environmental manufacturing practice is regarded as a primary source of better firm performance of many manufacturing companies in many countries of the world [7]. As such, many researchers have often investigated the relationship between environmental practices and firm performance, but the findings have resulted into conflicting views. This is because little consideration has been given to the perception of the benefits of environmental initiatives on the relationship between sustainable environmental manufacturing practices and the performance of firms.

Successful implementation of sustainable environmental manufacturing practices may be influenced by the benefits perceived by the firms: as either a burden (mere additional cost of operations) or benefits [8] by inducing the cost of saving. More dedication will be given by firms to the implementation of SEMP if it is perceived as beneficial and will thus improve performance achievement. However, firms will not be dedicated to the implementation of environmental initiative if it is not perceived to yield better firm performance [8]. These two different contentions on the perception of sustainable environmental manufacturing practices of firms require the need for investigating the influence of perceived benefits on the relationship between SEMP and the performance of firms.

## 2.0 LITERATURE REVIEW

### 2.1 Sustainable Manufacturing Practices And Firm Performance

Sustainable environmental manufacturing practices yield a better financial performance by out weighing cost involved in the pursuit of environmental practices that goes beyond legal requirement [9], [10], [11]. Thus, a positive significant relationship exists between

environmental practices and financial performance [12], [13], [14]. Environmental activities such as products life cycle analysis, collection and use of the reusable parts and components of the products is tended towards reducing environmental degradation and creates avenue for the identification of the areas that requires improvement in the quality of products of firms which can reduce damage due to waste disposal and cost of manufacturing operations as rework is avoided and quality is ensured from the beginning of operations [15]. Therefore, environmental management practices and operational performance are positively related [15]. In addition, internal environmental practices of firms are significantly related to environmental performance of firms [16]. Based on the above discussion, it is hypothesized that the implementation of SEMP and firm performance will positively influence the performance of firms. The following are the sub-hypotheses of the study:

**H1a:** Sustainable environmental manufacturing practices will positively influence financial performance.

**H1b:** Sustainable environmental manufacturing practices will positively influence operational performance.

**H1c:** Sustainable environmental manufacturing practices will positively influence environmental performance.

### 2.1 Perceived Benefits, SEMP and Firm Performance

The review of literatures on the environmental practices often identified the areas where the implementation of sustainable environmental manufacturing practices can bring about improvement in performance. When environmental practices are introduced into a manufacturing firm, the firm establishes a corporate policy that reflects the commitment of the top management of the firms to abide by the applicable laws and regulations towards sustainable environmental manufacturing practices. Such a commitment often arises when the top management perceives sustainable environmental manufacturing practices as benefits that accrued through the implementation of sustainable environmental manufacturing practices in their management systems. As such, perceptions of environmental practices is usually developed and subsequently justified by the management.

The implementation of sustainable environmental practices is regarded by firms as either a threat or opportunities [8], [17]. The implementation of SEMP will be more proactive when firm perceives the initiatives as a potential benefits and reactive when they feel that environmental initiative is a threat [18]. The greater a firm interprets environmental practices as opportunities, the more likelihood they implement the

initiative [19]. Hence, if truly firms perceive environmental sustainable practices as beneficial to the performance of their firms, the impact would be of a greater magnitude on firm performance [20].

Previous studies on environmental management practices found that perceived benefit is significant to being involved in environmental practices [20], [21]. Al-Shourah & Nasir Ibrahim [22] stated on the relationship between environmental management practices and the performance of five-star hotels indicate that benefits perceived by the companies moderate the relationship between the environmental management practices and hotel performance. Therefore, the current study is of the opinion that the benefits perceived by firms in implementing SEMP may influence the relationship between SEMP and the performance of the firm. Thus, it concludes that the impact of SEMP on firm performances will be stronger if manufacturing firms perceive that sustainable environmental manufacturing practices would be beneficial to the growth of their firms. Hence this study hypothesized that the higher firms perceive SEMP as benefits the stronger its relationship with performance. The following are the sub-hypotheses:

**H2a:** *Perceived benefits will moderate the relationship between SEMP and financial performance.*

**H2b:** *Perceived benefits will moderate the relationship between SEMP and operational performance.*

**H2c:** *Perceived benefits will moderate the relationship between SEMP and environmental performance.*

### 3.0 METHODOLOGY

#### 3.1 Survey Background

The survey was conducted in the Malaysian Manufacturing industry in order to collect the perception of the sustainable environmental manufacturing practices. The main focus of the study is to understand the relationship between sustainable environmental manufacturing practices and the performance of firms via the moderating effect of perceived benefits. Accordingly, manufacturers from different industrial sectors were analysed for the differences in their environmental practices. This is due to diverse in relation to restriction on legislation, resource availability of each industrial sector. The size of the manufacturing firms was used as excluding criterion based on the recommendation of [5] which asserted that the need, goals and challenges of smaller firms are different from that of larger firms as smaller firms are often characterized by limited resources. Thus, firms with lesser than 50 full-time employees are not feasible and were excluded from

the study due to their financial, technological and expertise limitation [23].

The respondents are in position of environmental, health & safety manager/executive (50.5%), followed by other position representing 19.4% of the respondents. Those respondents that fall in the category of production/ manufacturing manager/executive represent 17.5%, while operation manager/executive position has the least representation (12.6%). The positions in the other category range between technical executives, quality control executive, material management, manager, general manager, corporate social responsibility manager, quality assurance manager, ISO manager and facility manager.

Multinational companies has 45.6% representation, followed by the private enterprise which has 35%. The foreign invested enterprises is the next having 10.7% of the sample while the joint venture and state owned enterprise have 4.9% and 3.9% respectively. The result also revealed that 55.3% of the companies is certified in ISO 14001 indicating the awareness of environmental manufacturing practices in the companies.

#### 3.2 Study Sample

A sample size of 103 respondents from different manufacturing sectors comprised the data used in this research. The numbers of manufacturing firms from the study population were mainly from electrical electronic and computing (30.1%), chemical and allied products (16.5%), rubber and plastics (12.6%), food and beverages (10.7), basic metallic (5.8%), transport equipment (4.9%) and followed by paper and allied, textile wearing and apparel, and others which represents 2.9%, 1.9% and 14.6% respectively. The representation ensured that the homogeneity within each industrial sector and the heterogeneity across the entire manufacturing industry is achieved.

#### 3.3 Data Collection and Instrumentation

The study used a survey questionnaire which was posted to the operation, manufacturing manager or the environmental, health and safety manager of the manufacturing firms. The choice of questionnaire is based on its ability to reach a wide geographical location at a low cost and providing the respondents the opportunity to fill in the questionnaire at their own convenience [24]. The questionnaire consists of four sections: 1) the demographic, 2) firm performance, 3) sustainable environmental manufacturing practices, and 4) perceived benefits. Adapted from the previous literatures, the questionnaire was structured on a six-point Likert type scale with "1" indicating "strongly disagree" and "6" indicating "strongly agree".

### 3.4 Data Analysis Techniques

Data collected in this study was analysed using both Statistical Package for Social Sciences (SPSS) version 20 and Partial Least Square – Structural Equation Modeling (PLS-SEM 2.0 M3) [25]. Basically, SPSS was used for the preliminary data analysis, such as the detection and treatment of missing data, outliers and linearity assumption of multivariate analysis. The test of hypotheses was assessed by the PLS-SEM software based on the reasons that it offers several advantages in predicting significant relationship with small sample size, types of variables used, model complexity and place minimum requirement on data normality [26].

## 4.0 FINDINGS

### 4.1 Measurement Model

The assessment of the measurement model was done through the evaluation of the convergent validity, which is indicated by the item loadings, the average variance extracted (AVE) and the composite reliability (CR). The findings of the statistical analysis showed item loadings greater than the threshold (0.5) as recommended by [26]. In addition, the average variance extracted (AVE) result revealed 0.668 value for environmental performance (EP), 0.708 for financial performance (FP), 0.635 for operational performance (OP), 0.548 for both sustainable environmental manufacturing practices (SEMP) and perceived benefits. Also, the result revealed good internal consistency of the constructs with composite reliability value of 0.909 for EP, 0.906 for SEMP, while FP, OP and PB has 0.924, 0.913 and 0.906 respectively. Furthermore,  $R^2$  value of 0.143 was found for FP, 0.314 for OP and 0.220 for EP indicates that 14.3%, 13.4% and 22% variance level in FP, OP and EP respectively was explained by sustainable environmental manufacturing practices.

Furthermore, to determine whether the measure of each construct in the model is unique, discriminant validity was assessed using Fornel and Lacker criterion. The result revealed that the square roots of the constructs' AVE are greater than its corresponding correlations. Thus, indicating the achievement of discriminant validity.

### 4.2 Structural Model

The structural model in this study was assessed through the path analysis technique of PLS-SEM to test the stated hypotheses. The result of the standard path coefficient ( $\beta$ ), t-value and the decision taken on the hypotheses are presented in Table 1. The study found a statistical significant effect of SEMP on environmental performance ( $\beta = 0.264$ ,  $t = 2.336$ ,  $P < 0.05$ ), while SEMP does not significantly affect financial

( $\beta = 0.095$ ,  $t = 0.715$ ,  $P > 0.05$ ) and operational performance ( $\beta = 0.04$ ,  $t = 0.346$ ,  $P > 0.05$ ). Also, perceived benefit was found to moderate between SEMP and operational performance ( $\beta = 0.296$ ,  $t = 1.290$ ,  $P < 0.10$ ), while the relationship between SEMP and financial performance ( $\beta = 0.108$ ,  $t = 0.467$ ,  $P > 0.05$ ) and, SEMP and environmental performance ( $\beta = 0.102$ ,  $t = 0.579$ ,  $P > 0.05$ ).

**Table 1** Hypotheses testing result

Hypotheses	Statement of Hypotheses	Findings	Decision
H1a	SEMP positively influence FP	$\beta = 0.095$ t-value = 0.715	Not Supported
H1b	SEMP positively influence OP	$\beta = 0.040$ t-value = 0.346	Not Supported
H1c	SEMP positively influence EP	$\beta = 0.264$ t-value = 2.336	Supported
H2a	PB moderates between SEMP and FP	$\beta = -0.108$ t-value = 0.467	Not Supported
H2b	PB moderates between SEMP and OP	$\beta = 0.296$ t-value = 1.290	Supported
H2c	PB moderates between SEMP and EP	$\beta = 0.102$ t-value = 0.579	Not Supported

## 5.0 DISCUSSION

The first hypotheses posited a positive relationship between the implementation of SEMP and firm performance. The result found that SEMP only has a significant positive influence on environmental performance. However, financial and operational performance was not influenced by firm. Thus, hypothesis H1c was supported, while hypotheses H1a and H1b were not supported. Although, the findings show that SEMP has a positive influence on financial and operational performance, but the relationships are not significant. Contrary to the study of [12], [14], [15]. The non-significant relationship could be plausibly explained by the stage of implementation of sustainable environmental manufacturing practices in Malaysia. Omar & Samuel [27] revealed that manufacturing firms in Malaysia irrespective of their ownership regard sustainable manufacturing practices (SEMP) as an ethical behaviour. Though, necessary facilities for sustainable manufacturing practices were put in place, but as a reaction to the pressure from high environmental regulation with no consideration for environmental practices as a business strategy to achieve competitive advantage and better firm performance [28].

According to [29], certain objectives of the company are incorporated into the environmental management practices at this stage where

sustainable environmental manufacturing practice is regarded as ethical behaviour. Even though, environmental practices might have been incorporated into certain aspects of production processes of the firms, but they have not been incorporated as part of the firm's strategic factor [28]. Improvement in the environmental performance is the only benefits realized by firms that implements sustainable environmental practices due to mandatory pressure from environmental regulation. However, environmental practices are only significant among firms that adopts the implementation of the environmental initiatives as a result of voluntary reasons [30].

The relationship between sustainable environmental manufacturing practices on environmental performance is significant. Expectedly, the result showed a significant relationship, similar to the findings of [15], [16]. This finding implies that improvement in sustainable environmental manufacturing practices of firms enhances the achievements of environmental objectives such as reduced energy consumed by firms, carbon emission reduction, degradation of environment from the operations of manufacturing firms. As such, the more firms are committed to sustainable environmental manufacturing practices, the better will be their achievement of environmental performance.

Hypothesis H2b revealed a significant moderating effect between sustainable environmental manufacturing practices and operational performance. This implies that one standard deviation increase in perceived benefit would not only impact sustainable environmental manufacturing practices by 0.029 but would also increase the impact on the relationship between SEMP and OP from 0.029 to 0.307 ( $0.011 + 0.296$ ). This indicates if sustainable environmental manufacturing practices is perceived as benefits, the resultant effect will be an increase in the operational performance of firms. This also goes otherwise it is perceived by firms as a threat. As such, environmental practices should be implemented as benefits to achieve better performance [18].

However, the insignificant hypotheses (H2a and H2b) are not surprising as environmental practices are usually perceived as either a benefit or a threat [18]. According to Sharma *et al.* [18], it was affirmed that the financial status of firms will be influenced if environmental practices are perceived as benefits. However, the result as indicated by the findings (negative sign of the standardized beta value) of this relationship showed that environmental practices is still perceived as a threat (i.e. increasing the cost of manufacturing) among the respondents and as such, it is not considered as a strategic factor of the manufacturing companies.

Also, the perception of the traditional economist about environmental practices in firms posit that environmental improvement can cause reduction in the profitability of firm [28]. A significant amount of

cost is incurred due to e firms' compliance with environmental regulation and thus reduced the ability of the firm to compete [28]. Thus, the traditional view is of the opinion that, though simple prevention measures of environmental practices may enhance cost savings, but the ambitious practices of environmental sustainability may exceed the cost that can be derived from them.

## 6.0 CONCLUSION

This study has established the empirical evidence of the moderating effect of perceived benefits on the relationship between sustainable environmental manufacturing practices and firm performance. The findings of the study have revealed the understanding of the scenario of sustainable manufacturing practices in a developing country (Malaysia) as yet to be considered as a strategic factor. This result should not have come at any other time better than now that manufacturing companies are striving to go green and environmentally sustainable. As such, the current study has contributed theoretically by pointing out the reason why SEMP should be seen beyond ethical behaviour and as a strategic resource for achieving better performance. The study, therefore, suggested the creation of more awareness to enlighten the manufacturing practitioners not only to perceive sustainable environmental practices as ethical but also as a strategic factor in achieving better firm performance.

This study was conducted in a cross-sectional approach, however, it was found that the benefits of sustainable environmental manufacturing practices can be realized in a long term rather than short term. Therefore, studying the concept of sustainable environmental manufacturing practices in more than one point in time is required. Therefore, this research recommends that interested future researchers on sustainable environmental manufacturing practices should consider using longitudinal approach.

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