The Impact of Green Practices in Value Chain on Firm Performance in the Context of a Developing Country [version 1; peer review: awaiting peer review]

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Abstract

Background: Companies need to go green to remain relevant. Previous studies have confirmed that going green leads to superior performance for companies. However, research of green practices in a value chain requires further attention, especially in identifying the green value chain activities that lead to superior performance. A value chain analysis focuses on identifying competitive advantages of firms through five primary and four support activities.

Methods: This study extends from Ong et al. (2019), who developed and validated the instrument for the nine green value chain activities, to also examine their effect on firm performance. The 207 valid responses in this study are collected through a questionnaire survey of the sampling frame consisting of companies in Bursa Malaysia and the Federation of Malaysian Manufacturers Directory.

Results: The findings reveal that the companies’ green practices in primary value chain activities are higher than in the supporting value chain activities. Technological development is the activity with the lowest green attention among the nine value chain activities. Our multiple regression analysis shows that 25% of the variation in firm performance can be significantly explained by the nine green value chain activities. In terms of the individual green value chain activities, green technology development is the only activity that can positively and significantly explain firm performance.

Conclusions: The findings of the study suggest that companies intending to build their green core competence need to engage in green technology development. Companies that go green for the purpose of complying to regulations and fulfilling minimum customers’ demands can still embed green practices into their green value chain without compromising their performance.
Keywords
Green Practices, Value Chain, Firm Performance, Malaysian Corporations, Multilinear Regression Analysis

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Introduction

It is no longer a choice, but it is instead becoming necessary for companies to be environmentally friendly or greener in their business operations. Consumers, especially millennials, show a preference for environmentally friendly companies and products. Companies need to embed an environmentally friendly approach completely into multiple dimensions of their business operations in order capture the value created in the form of performance. Various research findings have confirmed that green practices in businesses lead to greater performance (e.g., Refs. 2–4). However, there is still an opportunity to further study green practices from the value chain perspective. The value chain, introduced by Porter, provides a comprehensive analysis of the value creation activities within a company. Anchoring green research to businesses from the value chain perspective can provide further detail on the actual value creation activities that lead to superior performance.

In analysing the competitive advantage of a firm, Porter introduced value chain analysis to distill the value creation activities within a company into five primary and four support activities. The five primary activities are the inbound logistics, operations, outbound logistics, marketing, and sales and services, denoting the complete value creation process from materials to after-sales services to the customers. The procurement, firm infrastructure, technology development, and human resources management support the primary activities as the support activities in the value creation process. Studies by Handfield, Walton, Seegar, et al. and Hartman and Stafford are among the early researches that explore the idea of a green value chain. Subsequently, Ndubisi and Nair, and Yong, Goh and Ong, Anthony Jnr and Ong et al. are among the studies that consider the full value chain in the context of Porter (1985). Both Anthony Jnr and Ong et al. have operationalized the value chain activities but neither of these studies examined the impact of the green value chain activities on firm performance. Anthony Jnr studies the impact of green value chain activities on the sustainable value chain practices while Ong et al. focus on validating the instrument.

Methods

The survey instrument for the nine activities of the green value chain was developed using responses from semi-structured interviews with 35 companies across different business sectors. The interviewees from these companies were in managerial positions and were asked to list the important green activities under each of the nine value chain activities suggested by Porter. Findings from these interviews were compiled and formulated into the survey instrument. There are a total of 99 items for the nine green value chain activities. On the other hand, the instrument to measure the firm performance is adopted from Ong and consists of seven items. All the items are measured using the seven-point itemized rating scale with one indicating strongly disagree and seven indicating strongly agree.

The survey form also consisted of a cover letter and an informed consent statement. These documents communicated the purpose of the study, and detailed the research sponsor and researchers, the research procedure, the voluntary nature of the study, the possible risks and benefits of participating in the research, and the confidentiality of the respondents identity. The respondents were informed that by returning the survey form, they indicated their consent to participate in the research but that they could withdraw their participation by informing the researchers.

A census method was used to contact all 1,150 companies listed in the main market and ACE market of Bursa Malaysia and the Federation of Malaysian Manufacturers Directory with complete mailing information. Letters were sent out to all. Fourteen letters were returned due to inaccurate mailing information. By the end of the survey, 207 valid responses were received. The assurance of confidentiality of the identity of respondents and the absence of fixed or expected responses in the survey aimed to ease the possible issue of common method variance.

The data collected was analysed using SPSS version 26 (IBM SPSS Statistics, RRID:SCR_019096). Alternatively, GNU PSPP is a free open-source software that can be used to perform similar functions. The results are presented in the next section, starting with the presentation of a brief profile of the responding companies, followed by the reliability and validity analysis and mean analysis for all the variables. Lastly, the impact of the nine green value chain activities on firm performance is tested using multiple linear regression analysis.

Results

The demographic profile of the companies, in terms of the company size, years of operation, and status of ownership, are presented in Table 1. The statistical results show that more than half of the companies have 1,000 or fewer employees. In terms of years of operation, close to half of them have operated for 10 years and lesser. A vast majority of them are locally owned.

We performed exploratory factor analysis on the all the items for the nine green value chain activities and the firm performance. Results show that the Kaiser-Meyer-Olkin (KMO) is higher than 0.80 and the Bartlett’s test of sphericity is significant at the 95% confidence level. Two items, one each for Operations and Services were removed due to cross
loading. The rule of thumb used was that the loading must be above 0.40 in one factor only. The inter-item consistency for all individual variables was tested using Cronbach’s Alpha, with results indicating a satisfactory level of inter-item consistency for all variables. The details are presented in Table 2.

In addition, Table 2 presents the mean and standard deviation for each variable. The mean for the nine green value chain activities ranged from 3.68 to 5.66 on the seven-point scale. The activity with the highest mean score was services, with a mean of 5.66 and a standard deviation of 1.03. On the other hand, technology development had the lowest mean with a score of 3.68 and a standard deviation of 1.44. Firm performance had a mean score of 4.91 and standard deviation of 0.96 on the seven-point scale.

Table 3 shows the results of the multiple linear regression analysis. This analysis was used to test the effect of the nine green value chain activities on firm performance. The correlation coefficient, R, was 0.500 and the R-squared was 0.250 (F = 7.282; p < 0.05). This shows that 25% of variation in the firm performance is explained by the nine green value chain activities. Among the nine green value chain activities, only technology development was found to have a significant impact on firm performance (Beta = 0.257; t-value = 2.815; p < 0.05).

Discussion
The general profile of the sample companies in the study is relatively small and young with more than half of them having employee numbers below 1,000 and near to half of them having been established for less than 10 years. In terms of the value chain activities, these companies embed green practices into the primary value chain better than the support activities, except for the inbound logistics. The smaller size of suppliers could contribute to lesser enforcement of green practices in this primary value chain activity. A worrying observation is that the green practices in the four support activities ranged from 3.68 to 5.66 on the seven-point scale.

Table 1. Profile of responding companies.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Attribute</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company size (No of employees)</td>
<td>500 and lesser</td>
<td>52</td>
<td>25.10</td>
</tr>
<tr>
<td></td>
<td>501 to 1,000</td>
<td>65</td>
<td>31.40</td>
</tr>
<tr>
<td></td>
<td>1,001 to 1,500</td>
<td>35</td>
<td>16.90</td>
</tr>
<tr>
<td></td>
<td>1,500 to 2,000</td>
<td>21</td>
<td>10.10</td>
</tr>
<tr>
<td></td>
<td>2,001 and more</td>
<td>34</td>
<td>16.40</td>
</tr>
<tr>
<td>Years of operation</td>
<td>10 years and below</td>
<td>91</td>
<td>44.00</td>
</tr>
<tr>
<td></td>
<td>11 to 20 years</td>
<td>72</td>
<td>34.80</td>
</tr>
<tr>
<td></td>
<td>21 to 30 years</td>
<td>22</td>
<td>10.60</td>
</tr>
<tr>
<td></td>
<td>31 years and above</td>
<td>22</td>
<td>10.60</td>
</tr>
<tr>
<td>Status of ownership</td>
<td>Local</td>
<td>173</td>
<td>83.60</td>
</tr>
<tr>
<td></td>
<td>Foreign</td>
<td>34</td>
<td>16.40</td>
</tr>
</tbody>
</table>
activities are low. Without the right technology, infrastructure, procurement processes, and human resources, the effectiveness and sustainability of the green practices in the primary activities remain questionable. Our findings suggest that the companies need to strengthen their green practices in technology development to achieve better performance. Unfortunately, technology development has the fewest elements of green practices among the nine value chain activities. Our findings suggest that the involvement of companies in the research and development of green technologies is crucial for companies to gain superior performance. This signifies the importance of proprietary green technology to firm performance. The visibility of a company’s involvement in green technology development could be a contributor, especially for those involved in the business-to-business sector. The capability and experience in green proprietary technology development is vital to gain superior performance from going green. In the case of Malaysia, based on this study, the worrying situation is the lack of involvement of the companies in green technology development. On the other hand, there is no evidence to show that involvement in green practices inversely affects firm performance.

Companies have to make a strategic decision in going green. They could decide to take a strategic move to create core competency by developing the green technology to gain superior performance. On the other hand, companies can decide to use the compliance model by fulfilling the minimum regulatory or customer requirements in going green. They can build their core competency elsewhere. There is no evidence from this study that the latter model could cost their performance. The findings from the green practices in primary and support value chain activities, show that most of the companies could be using the latter model.

Conclusions
The study extends from Ong et al.11 to further analyse the impact of green value chain activities on firm performance. Our findings support the notion that companies involved in green activities can gain superior performance. There is no evidence suggesting that embedding green practices in the value chain can have a negative impact on firm performance. Companies need to have the correct business model and strategy in approaching the trend of increasing demand to be environmentally friendly. Nonetheless, future research could further validate the instruments used in this study. Future research could also study the existence of mediators or moderators that cause the insignificance of all the primary green value chain activities in explaining the superior firm performance.

Data availability
Figshare: https://doi.org/10.6084/m9.figshare.14883240.v115

This project contains the following underlying data:

- GVC_Dataset_Share.sav (The dataset was collected through a questionnaire)

Data are available under the terms of the Creative Commons Attribution 4.0 International license (CC-BY 4.0).


**Ethical approval and consent**
The consent form was attached to the survey form and sent to the respondents as a letter. The form included the research purpose, research sponsor, research procedures, a statement of voluntary participation, confidentiality of the respondents and the company’s identity, risks and benefits of participating in the study and a statement on consent agreement. The consent agreement clearly spelled out that completing and returning the completed survey form indicated the respondent’s consent to participate in the research.

Ethical approval was granted by the Research Ethics Committee (REC) of Multimedia University. The committee granted the approval after reviewing the self-declared form submitted by the researchers.

The approval number is EA2312021.

**Author contributions**
Ong, J. W. involves in data collection and data analysis and completing the first draft of write-up for this article.

Goh, G. G. G. contributes in the items development and editing the final version of this article.

Yong, H. S. S. involves in early stage interviews that subsequently leads to the measurement items development. She assists also in data collection.

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**References**

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