

The Relationship between Leadership Commitment, Environmentally Sustainable Operations and Firm Performance: Evidence from a Survey of Ghanaian Manufacturing Firms

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Abstract: The last decade has seen growing interest in environmentally sustainable operations in emerging economies. However research into the drivers and outcomes of environmentally sustainable operations of manufacturing firms in Africa has been largely lacking. This study develops a research model which proposes that environmentally sustainable operations are driven by a leadership commitment to green practices and results in improved firm performance. Data to test the research model was derived from a survey of 334 manufacturing firms operating in Ghana and was analyzed using partial least squares structural equation modeling. The results of the study confirmed that leadership commitment had a significant effect on environmentally sound operations, which in turn significantly impacted firm performance. The implications of the study are discussed.

1 INTRODUCTION

The past two decades have witnessed considerable growth in the concerns for the environment. There have been growing calls for firms to minimize the environmental effects of their business operations as a result of environmental challenges such as global warming, climate change, land, water and air degradation, and renewable natural resource depletion (Morelli, 2013). Research into environmentally sustainable business operations has also grown considerably over the past decades, with the majority of recent studies exploring green practices not only in individual firms but across the entire supply chain (Srivastava, 2007).

Whilst the research into the adoption of environmentally sustainable operations has been growing in recent years, it is still not clear what causes some firms to better implement environmentally sustainable operations compared to others. Existing literature has also not properly explored the outcomes of adopting environmentally sustainable operations within an African context. This study attempts to address these research gaps by proposing the firm's leadership commitment to green practices plays a vital role in the level of environmentally sustainable operations achieved,

which subsequently translates into significant firm performance gains. Leadership commitment refers to the managerial preparedness to assign resources and take behaviors that lead to the advance of capabilities in-line with the anticipated results (Noble et al., 2002). Thus in the context of this study, leadership commitment to green practices refers to the willingness of top management to lead the firm's green implementation. Firm performance is a measure of the ability of the firm to meet its functional and financial performance objectives.

The study is significant in a number of ways. First, the study provides an explanation for why some firms are able to outperform others in their green practices outcomes, by confirming that firms with a stronger top management commitment to green practices achieve higher levels of environmentally sustainable operations. The study also establishes that higher levels of environmentally sustainable operations result in higher firm performance within an African context. The study as well provides insights for leaders of firms to help guide them in their efforts to achieve higher levels of environmentally sustainable operations.

The rest of the paper is presented as follows. The theoretical and research model are presented next, followed by a discussion of the methodology. The results of the study are then presented and discussed.

The study concludes with a discussion of the implications of the study, limitations of the study, and directions for future research.

2 CONCEPTUAL FRAMEWORK AND HYPOTHESES

The study is grounded on the resource-based view of the firm, which proposes that firms are able to outperform their rivals when they possess superior resources, competences, and capabilities. Specifically, firms that possess resources and capabilities that are valuable, rare, and not easily imitable resources and capabilities are able to gain a competitive advantage over their rivals (Barney, 1991). Capabilities refer to bundles of skills, competences, and resources that are used to perform a task (Barney, 1991). Effective leadership has been explored as competence in previous studies (Preston et al., 2008). This study views leadership commitment to green practices as an important competence that influences the level to which firms achieve environmentally sustainable operations. Environmentally sustainable operations then serve as valuable capabilities that firms can use as a basis for achieving superior performance.

The conceptual framework of the study proposes that firms' leadership commitment to green practices impacts the level of environmentally sustainable operations they achieve, which in turn impacts their firm performance. Leadership commitment is also proposed to directly influence firm performance. The conceptual framework is presented in Figure 1 below.

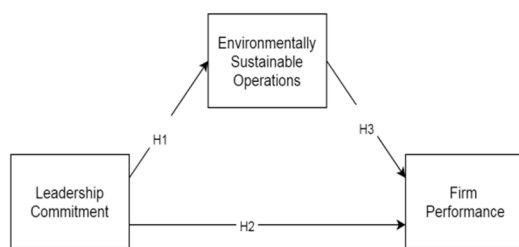


Figure 1: Conceptual framework

The pursuit of environmentally sustainable operations demands certain capabilities to help in the implementation. It has been contended that robust commitment and outstanding leadership are required to improve competitiveness and sustainability of supply value chains (Defee et al., 2009; Gosling et al., 2017). A well trained top management team

committed to implementing green practices in an organization is vital for high levels of environmentally sustainable operations to be achieved (Dubey et al., 2015; Zhu et al., 2005; Pagell and Wu, 2009). The study, therefore, proposes that firms with high leadership commitment to green practices will have higher levels of environmentally sustainable operations. It is therefore hypothesized that:

H1: Higher levels of leadership commitment to green practices lead to higher levels of environmentally sustainable operations

The study additionally hypothesizes that firms with high leadership commitment to green practices attain higher firm performance. According to the resource-based view, firms possessing superior resources, competences, and capabilities that are able to attain a superior competitive advantage (Barney, 1991). Leadership commitment to green practices represents one such competence and is expected to result in firm performance gains in the form of minimization of cost on resource utilization and increased efficiency in operations (Overstreet et al., 2013; Birasnav 2013). Thus it is hypothesized that:

H2: Higher levels of Leadership commitment lead to higher levels of firm performance

Firms that have high levels of environmentally sustainable operations are able to minimize resource usage, utility bills, fines through non-compliance to environmental laws, and resource wastage (Emmett and Sood, 2010). This is expected to result in considerable cost savings for the organization, thereby improving the financial performance of the organization. Thus, the study hypothesizes that:

H3: Higher levels of environmentally sustainable operations lead to higher levels of firm performance

3 METHODOLOGY

Measurement items for the constructs were sourced from items previously used in literature. The items were modified slightly to fit the context of the study. The items were also submitted to two academics and three business leaders who were experts in environmentally sustainable operations for content validation. Their inputs were used to refine the questionnaire items.

Data for the study was obtained through a survey of selected manufacturing firms in Ghana, an emerging West African country. A directory of

manufacturing firms operating in Ghana was obtained, and 640 manufacturing firms were randomly selected for the survey. The research questionnaire, including a cover letter, was delivered to each selected firm through email, and some were delivered by hand. After two rounds of follow-ups, a total of 334 usable questionnaires were retrieved, representing a response rate of 52.18%. The analysis was done using Partial Least Squares Structural Equation Modeling (PLS-SEM).

4 RESULTS

4.1 Demographic Results

Analysis of the demographic data revealed that there was a fair representation of firms of different sizes, with the majority (25.7%) of the responding firms having 500 to 1000 employees. In terms of industry groups, classical manufacturing firms (42.5%) and wood/furniture firms (35.3%) were strongly represented. The full demographic data is presented in Table 1 below.

Table 1: Demographic results

Number of employees	Frequency	Percent
Up to 30	18	5.4
30 to 100	60	18.0
101 to 500	59	17.7
501 to 1000	86	25.7
More than 1000	46	13.8
Missing	65	19.5
Total	334	100.0
Industry	Frequency	Percent
Manufacturing	142	42.5
Wood/Furniture	118	35.3
Mining/Extraction	2	0.6
Construction	3	0.9
Other	54	16.2
Missing	15	4.5
Total	334	100.0

4.2 Measurement Model Results

To assess the measurement model, we followed the guidelines proposed by Hair et al. (2019). First, indicator loadings were assessed to determine if they exceeded the minimum cut-off criteria of 0.708. This serves as an indication that the construct explains more than 50 percent of the indicator's variance, thus providing acceptable item reliability. All items

possessing factor loadings less than 0.708 were dropped, with the remaining item loadings (in bold) meeting this threshold, as can be seen from the results in bold in Table 2.

Table 2: Items loadings and cross-loadings

	ESOP	LDCOM	PERF
ESOP1	0.833	0.245	0.406
ESOP2	0.834	0.233	0.287
ESOP3	0.806	0.288	0.295
ESOP5	0.809	0.220	0.336
ESOP6	0.813	0.275	0.343
LDCOM1	0.236	0.835	0.302
LDCOM2	0.270	0.890	0.316
LDCOM3	0.266	0.915	0.335
LDCOM4	0.281	0.884	0.370
LDCOM5	0.295	0.840	0.272
PERF1	0.293	0.270	0.819
PERF3	0.367	0.286	0.855
PERF4	0.387	0.278	0.906
PERF5	0.325	0.307	0.904
PERF6	0.410	0.312	0.913
PERF7	0.335	0.405	0.783
PERF8	0.336	0.332	0.820

Next, the internal consistency reliability of the constructs was assessed by examining the Composite Reliability and Cronbach Alpha values. Composite reliability values ranged from 0.911 to 0.951, whilst Cronbach Alpha values ranged from 0.877 to 0.940, both meetings recommended benchmarked thresholds (Hair et al., 2019). The convergent validity of the constructs was then assessed. Convergent validity is the extent to which the construct converges to explain the variance of its items. The metric used for evaluating a construct's convergent validity is the average variance extracted (AVE) for all items on each construct, with an AVE 0.50 or higher deemed acceptable. The AVE values ranged from 0.671 to 0.763, meeting this requirement. The summary of the tests for convergent validity is presented in Table 3 below.

Table 3: Attributes of constructs

Constructs	Cronbach's Alpha	Composite Reliability	AVE
ESOP	0.877	0.911	0.671
LDCOM	0.922	0.941	0.763
PERF	0.940	0.951	0.737

Next, the discriminant validity of the constructs was assessed, which is the extent to which a construct is empirically distinct from other constructs in the structural model. Discriminant validity can be assessed by comparing the square root of the AVE for each factor against the correlation of constructs against each other, with the former required to be higher than the latter (Fornell and Larcker, 1981). In Table 4, the bold diagonal figures represent square roots of AVEs whilst the off-diagonal figures represent correlation among constructs. It can be seen that the bold diagonal values are all greater than the off-diagonal ones, confirming adequate discriminant validity.

Table 4: Fornell-Larcker criterion

	ESOP	LDCOM	PERF
ESOP	0.819		
LDCOM	0.309	0.873	
PERF	0.411	0.367	0.859

Hair et al. (2019) and Henseler et al. (2015) argue that the Fornell-Larcker criterion is not a strong metric of discriminant validity, with the heterotrait-monotrait (HTMT) ratio of the correlations proposed as a more stringent alternative (Voorhees et al., 2016). The HTMT is defined as the mean value of the item correlations across constructs relative to the (geometric) mean of the average correlations for the items measuring the same construct, with HTMT values of less than 0.90 and below recommended for constructs that are conceptually similar and HTMT values of 0.85 and below recommended for constructs that are conceptually dissimilar (Henseler et al., 2015). From Table 5, the model passes this test, confirming discriminant validity.

Table 5: HTMT results

	ESOP	LDCOM	PERF
ESOP			
LDCOM	0.342		
PERF	0.446	0.390	

4.3 Structural Model Results

After confirming the soundness of the measurement model, we proceeded to analyze the structural model and hypothesized relationships. Before assessing the structural relationships, collinearity was examined to ensure it does not bias the regression results. This

was done by assessing the variance inflation factor (VIF) of the latent variables. The VIF values ranged from 1 to 2.093, which meets the requirement of being less than 3 (Hair et al., 2019). Next, the model's in-sample explanatory power was assessed by examining the R^2 values of the endogenous variables. R^2 for the endogenous variables were quite low, with Environmentally Sustainable Operations having R^2 of 0.095 and Firm Performance having R^2 of 0.233. A check of the predictive relevance of the model using the Q^2 , however confirmed the predictive relevance of the model since they were larger than 0.

The hypothesized paths were analyzed by examining their path coefficients and t-values. The results of the tests of hypotheses are presented in Figure 2 and Table 6.

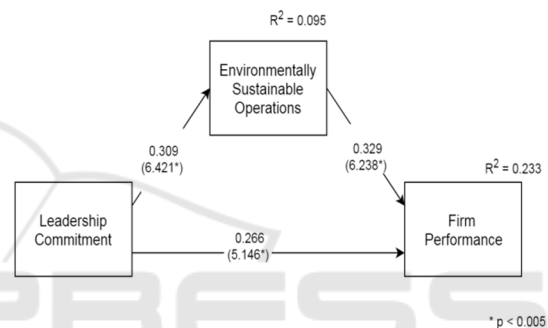


Figure 2: Structural model results

Table 6: Summary of hypotheses results

Hs	Hypothesized	Path Coefficient	T Statistics	Support
H1	LDCOM → ESOP	0.309	6.421	Supported
H2	LDCOM → PERF	0.266	5.146	Supported
H3	ESOP → PERF	0.329	6.238	Supported

The findings of the study revealed that all three hypotheses were supported. Higher levels of leadership commitment resulted in higher, environmentally sustainable operations. This means that one-way firms can improve their environmentally sustainable operations is to get leaders of the firm to commit to green initiatives. This supports the assertions of Dubey et al. (2015) and Gosling et al. (2016) that leadership commitment is essential to achieve sound environmental practices. Also, firms with higher leadership commitment to green practices had higher

levels of firm performance as hypothesized, supporting the assertions of Dubey et al. (2015). This means that firms with high levels of leadership commitment to green practices can expect both improved environmentally sustainable operations and improved firm performance. Finally, high, environmentally sustainable operations lead to higher firm performance (Emmett and Sood, 2010). High commitment to green practices enables firms to minimize costs and become more efficient, which ultimately reflects positively on firm performance.

5 CONCLUSION

The study explored the effect of leadership commitment to green practices on environmentally sustainable operations and firm performance in a Sub-Saharan African country. Analysis of data from a survey of 334 firms revealed that higher levels of leadership commitment to green practices enhance both environmentally sustainable operations and firm performance. Additionally, higher levels of environmentally sustainable operations enhance firm performance.

There were some implications of the study. The study presents new insights into the relationship between leadership commitment, environmentally sustainable operations, and firm performance, a subject that has not been properly explored in previous studies. Further, prior research suggests that the outcomes of supply chain management initiatives in Sub-Saharan African countries may be different from outcomes observed in developed regions from where most of the current studies originate (Asamoah et al., 2016; Agyei-Owusu et al., 2016). The study thus provides context-specific insights into the positive outcomes of both high leadership commitment to green practices and environmentally sustainable operations in a Sub-Saharan African country. By way of implications for practice, the study provides insights that can guide firms that want to achieve higher levels of environmentally sustainable operations in Sub-Saharan Africa.

There were some limitations to the study. First, the findings of the study may not be supported in other regions of the world as the study was conducted within the Sub-Saharan African context. More studies on the antecedents and outcomes of leadership commitment to green practices from different regions are needed. Further studies are also needed to explore the effects of leadership commitment on other dimensions of sustainability.

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- growth in sales
growth in profit
growth in number of employees
growth in market share / customer size

APPENDIX

Measurement Items

Leadership Commitment (LDCOM)

We hold regular meetings to discuss environmental management issues and initiatives

We allocate substantial budgets for solving environmental problems

Our management spend substantial time and effort on solving environmental problems

Our management devote a lot of energy to learning and understanding emerging environmental concerns

Our company has been engaging industry business partners and industry experts on how to be environmentally friendly

Environmentally Sustainable Operations (ESOP)

Compared to management's expectations, how much cost savings has your company made from the following over the past 3 years?

energy/power consumption

water usage

raw material usage

fines for non-compliance with environmental regulations and laws

fuel consumption

materials for product/service design/packaging

Firm performance (PERF)

Compared to expectations, how satisfied are you with your company's most recent performance in terms of...

sales revenue

return on sales

return on investment

profit margin