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The Moderating Effect of Managerial Environmental Concern on the Relationship between Green Innovation and Firm Performance: Evidence from Bahrain

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Abstract: This study aimed to demonstrate the relationship between environmental innovations and performance, both operational and financial, in the business environment in the Kingdom of Bahrain, as well as to demonstrate the impact of administrative environmental concern on this relationship. The question is whether Managerial environmental concern strengthens or weakens this relationship? Through a questionnaire distributed to 56 respondents working in administrative positions in (12) Bahraini companies, and through the use of hierarchical linear modelling analysis, the direct impact of green innovation was proven, as was the positive impact of Managerial environmental concerns on this relationship. The study recommended that more studies should be conducted by introducing more moderators and mediators' variables to achieve a better understanding of the relationship between environmental innovation and performance. Proving this relationship will create a motivation for companies to take an interest in protecting the environment, which means unlimited positive impacts on the environment.

Keywords: Green innovation, Sustainability, Organizational Performance, Financial Performance, Managerial Environmental Concerns, Bahrain.

1 Introduction

Environment and resources have increasingly become some of the critical issues brought about by the rapidly growing global economy. Green innovation is an umbrella term that is used to describe the new or differentiated processes, products, techniques as well as systems that are implemented by business organizations purposefully check on the environmental harm [1]. Studies have postulated that the two issues are increasingly becoming bottlenecks of sustainable development [2]. In response, in most places and especially in the kingdom of Bahrain, there have been measures to promote green innovation.

Businesses executive managers have increasingly put up measures aimed at reducing potential environmental challenges. The measures include resorting to appropriate, environmental conscious guidelines and practices in all business operations. As such, the management employs significant moderating effects of key environmental variables to check the overall environmental impact. The relationship between organizational performance and green innovation can either be strengthened by the moderating effects of the variables.

Globally, countries have invested hugely in measures to ease conflicts arising from balancing economic growth with both energy consumption and environmental protection [3]. As such, the challenge of achieving ecologically sustainable development and living standards continue to be a challenge not only to the Kingdom of Bahrain but nearly every nation [4]. As a measure to address environmental concerns, Bahrain has been at the forefront at recognizing that new or modified processes need to embody far much greener features than and technological products [2]. An essential element in this issue has been the increased recognition that new technological products and processes must embody greener characteristics than the ones employed in the past [5]. Therefore, a common notion that environmental innovations form part of the crucial breakthrough towards sustainability of resources for both societies and organizations. This notion explains why many kinds of research on business organizations within Bahrain have come up with variables that can be argued to impact

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on the relationship between green innovations and business performance in the last decade. Moreover, many countries have also come up with significant environmental protection laws aimed at reducing the impact of industrial growth on environments. In many contexts, the primary objective is to heighten the organization's environmental performance [6]. This leads to the question of the possible moderating effects strengthening the association between green innovation and organizational performance.

Huang [7] noted that green innovation means creating products or production processes by addressing environmental problems resulting in the product life cycle. Weag, et al [8] mentioned that it is new or modified products and processes that include technical, administrative and organizational innovations that help preserve the surrounding environment. Sterbrink & Westerberg [9] explained that it is innovation related to green products and processes including innovation in technologies that contribute to energy saving, reducing pollution and recycling wastes regulation, and manufacturing green products or firm environmental management. Ma et al. [10] define it as the innovation of new or modified processes, technologies, systems, and products, or reduction of environmental damage. Li et al. [11] Added as innovation in technologies, products, services, organizational structures or administrative methods adopted by companies to achieve sustainable development. Consistent with the preceding, researchers see that green innovation indicates the establishment of methods, technologies and procedures that contribute to reducing the adverse effects of production processes on the environment to ensure the sustainability of the environment and its resources in the interest of present and future generations.

2 Literature Review

2.1 Green Innovation and its Effect on Business Firms

Green innovation has become part of every business in the technological world. The need for environmental protection has enabled firms to identify the relevance of adopting Green innovation. According to Ar, [12] green innovation impacts on both the competitive capability and firm performance. Environmental innovation is desired to help offer solutions relating to climate change concerns. Corporates and firms have the opportunity to change emissions that are harmful to the environment using green innovation. There is a need for more companies to adopt green innovation towards saving the planet besides improving company image and resulting in improved firm performance. In a study collecting information from manufacturers in Turkey, the data collected using questionnaire was critical in understanding the firm performance and competitive capability with firms practicing green innovation. The outcomes of the study on 140 firms within the Turkish business environment revealed a positive effect on competitive capacity and firm performance for green product innovation. The ability to enjoy excellent business performance requires the adoption of green or environmental change [5].

Employees within the manufacturing department are encouraged to engage in the use of efficient energy. Companies invest in hydropower, solar, ocean, geotherm and biomass among alternative sources of energy to avoid the use of fossil fuels. Workers are also encouraged to use green practices and technologies in reducing pollution [13]. The conservation of natural resources will help firms in ensuring land management, wildlife conservation and organic agriculture to preserve the environment.

According to Ma, Hou, and Xin [10], green process innovation offers long term benefits to a firm. It is an indication of the firm value achieved and subsequently improved the performance of a business. However, another observation made within the study involved a lack of a significant relationship between firm performance and its firm image in the short-term. The research done on coal firms within China used 267 survey data in concluding the long-term benefits associated with the firm image. Firm image translates to positive benefits on the market share of the company. Green innovation brings into perspective the utilization of new techniques, processes, products, and systems in minimizing damage to the environment [3]. These measures have been effective in ensuring that the business environment is safe and clean from hazardous materials. The financial performance of such firms is positive and aligns with the efforts put in place to protect the environment. Similarly, according to the study done by Kneipp et al. [14], insight from Brazilian industrial firms indicated that there are positive associations with variables relating to company performance and sustainable innovation practices.

2.2 Managerial Environmental Concern as a Moderating Variable

Managerial environmental concern addresses the need for business executives to commit to environmental matters. These include the adoption of strategies and practices that promote innovative activities within the company towards enhancing performance.

According to Xue , Boadu , and Xie [6], the activation of green innovation depends on the presence of managerial environmental concern and absorptive capacity. Firm performance relies on managerial approaches to sustainability and green innovation practices. According to Tang et al. [15], current literature informs on the existence of a definite link between firm performance and greeninnovation. Managerial concern provides positive effects on the relationship among the identified variables. Positive managerial concern for the environment results in the adoption of green innovation and consequent benefits on the firm. The level of managerial interest plays a moderating role in the business and helps to understand the link between green process and product innovation to firm performance [15].

Business policies that offer managerial control on sustainability concerns help in establishing a strong structure for green innovation. Management plays the role of translating green innovation practices into firm performance. Management is the catalyst in addressing green issues and provide support, attention, and significant time in strengthening innovation [16]. Managerial support enhanced the willingness of a firm to implement green innovation. However, green innovation improves the competitive nature of firms and their performance. Green product and process innovation demand the support and willingness of management to ensure corporate environmental ethics. According to Ar [12], organizational encouragement is a factor that enables a firm to adopt green practices for green innovation performance. It is an essential driver within the adoption of sustainability practices in establishing corporate environmental ethics.

2.3 Organizational Performance and Financial Performance

Organizational performance is critical to ensure the continued existence of a firm in its industry. Business is engaged in various operations to ensure revenues and profitability match the desires of investors. The use of green innovation targets the presence of sustainability practices to enable competitive advantage among practicing firms. Financial performance reflects on the revenues of a business, while organizational performance involves efficiencies in operations. Organizational performance requires the input of workers and management towards attaining green innovation practices. These approaches are essential to generate new revenue for the business through new purchasing patterns [1]. Business performance should reflect as well within cash flow that will be analyzed in the financial performance of a firm when adopting green innovation. The financial performance of the business increases with increased revenues associated with green innovation. Besides, cost savings from efficient operations are reflected in the profitability of the business. According to Xue, Boadu & Xie [6], the positive impact on the organization from green innovation practices leads to a competitive advantage. Companies focused on green innovation will experience a rise in sales volumes that changes its financial position.

3 Hypothesis Developments

(Hypothesis 1a) Green innovation and operational performance will be positively related.

Operational performance helps the organization to address issues such as waste, reduction of environmental impact and carbon emissions. These issues impact on corporate reputation, productivity as well as competitiveness. Green innovation helps in meeting such operational performance concerns for the company leading to enhanced competitiveness.

(Hypothesis 1b) Green innovation and financial performance will be positively related.

Financial performance is critical for investors to continue offering capital to a business. The relation between firm financial performance and green innovation has been identified as positive. eco-innovation methods in establishing the desired status and will, through green-labelled branding. Potential clients are attracted in the process leading to financial gain.

(Hypothesis 2a) The superior the managerial environmental concern, the stronger the positive effect of green innovation on a firm's operational performance.

This research paper aims to find an explanation for the contradictory trend between environmental innovations and corporate performance. Previous studies have reached inconclusive results on these two critical variables. However, some researchers have found that some organizational or Contextual factors can influence the adoption of green innovations in any organization. For example, for a company to achieve useful, innovative applications, organizational support plays a crucial role in facilitating the process. Therefore, the managerial environmental concern can affect the relationship between green innovation and the company's performance as predicted by H1a-b.

(Hypothesis 2b) The higher the managerial environmental concern, the stronger the positive effect of green innovation on a firm's financial performance.

The financial performance of a business is linked to its managerial decisions. Business executives have the control of company resources that help in attaining green innovation status. It demands the business to be sensitive to environmental issues such as pollution and degradation. However, these decisions on translating the outcomes of green innovation into financial performance remain the sole responsibility of business executives [17]. A positive effect is seen within green innovation when the managerial environmental concern is present in a company. It entails identifying some of the managerial traits that will enhance the adoption of green innovation to promote financial performance.

4 Methodologies

The study used a quantitative approach and quantitative data that was gathered throughout a questionnaire to analyze how green innovation influences firm performance and what effects environmental managerial concerns have on this relationship. The questionnaire used is the one used by Xue et al. [6] as it is very much suitable to the companies in Bahrain. The instrument used by Xue et al. [6] was tested using all tests of reliability and validity.

4.1 Study Sample

To test the hypotheses, the study targeted those holding supervisory positions in the Bahraini listed companies in Bahrain Bourse and other big companies to assess green innovation and environmental managerial concerns. (20) companies were selected, and (5) questionnaire was sent to each company. (10) companies returned the five questionnaires and (2) returned three questionnaires and (8) companies did not return any. The final number of questionnaires was (56).

4.2 Statistical Analysis

The present research applied hierarchical linear modelling (HLM) for the purpose of hypothesis testing. This type of approach was deemed essential based on the nested form of the data. This type of technique makes it possible to handle assumptions as well as the hypothesis of the homogeneity as well as the independence of random error.

4.3 Control Variables

The variables used for this study included: firm size, firm age, industry type, and ownership. Previous scholarly research has always recorded the size of the firm impact on their performance [18]. Whether large or small, the firm size plays an essential role in how it performs. Bigger firms usually face great level of pressure from both civil society institutions as well as the government. These groups of stakeholders generally regulate the operations of big firms so as to prevent activities that might be harmful to the environment. Based on their size, however, big firms can easily acquire resources and expand their businesses even more [19].

It is important to note that other than the size, the number of years in operation also impact on the performance of the firm. Firms which have stayed in the business for a longer period of time usually perform better than the new entries [20]. Scholarly studies have also shown that the type of industry significantly impact on the firm performance. This is primarily due to dynamics in technology and the market. For example, dynamics in the market might force a given firm to look for a specified innovation activity so as to remain highly competitive in a given market. The research controlled for industry characteristics that might be linked to organizational performance (1 = manufacturing, and 0 = non-manufacturing). Furthermore, prior research found that ownership type may influence firm performance, hence, the study controlled for the ownership with government ownership by giving the value of 1 and private ownership by giving it the value of 0 [21].

4.4 The Model

Figure (1) below shows the conceptual model of the research.

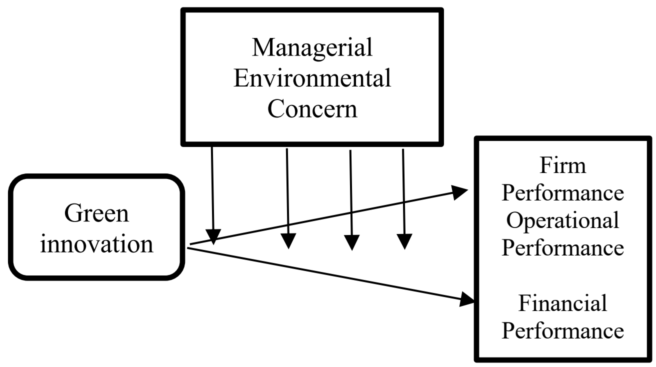

Fig1: The Study Model

4.5 Hypotheses Testing

Hierarchical linear modelling was applied to evaluate all the hypothesis in this case. The first hypothesis considers the direct link between the independent variable (IV) and dependent variables (DVs). In contrast, the second hypothesis considers the moderating role of managerial environmental concern on the association, which is there between independent variables and the dependent variables.

5 Results

Main Effect Test - H1a proposes that green innovation will be positively related to operational performance. The coefficient for green innovation on operational performance is positive and significant ($\beta = 0.279$, $p < 0.01$, $R^2 = 0.257$), see Model 2 in Table 1. As such, H1a is strongly supported.

-H1b predicts that green innovation will be positively related to financial performance. In our results from Table 2, Model 5 reveals that there is a positive correlation between green innovation and financial performance (β= 0.306, $p < 0.01$, $R^2 = 0.231$). Thus, H1b is confirmed.

Table 1. Results of hierarchical linear modelling analysis (operational performance).

Variables	Dependent Variable: Operational Performance		
	Model 1	Model 2	Model 3
Firm Size	0.229 (0.043) *	0.164 (0.047) *	0.164 (0.042) *
Firm Age	-0.128 (0.05) *	-0.156 (0.049) *	-0.123 (0.048) *
Manufacturing	0.152 (0.0121) *	0.14 (0.0118) *	0.125 (0.0116) *
State ownership	-0.211 (0.00123) **	-0.103 (0.13)	-0.095 (0.128)
Green innovation		0.279 (0.0066) **	0.275 (0.0064) **
Managerial environmental concern (MEC)			0.06 (0.056)
Green innovation x MEC			0.189 (0.048) *
R^2	0.194	0.257	0.287
F	13.235 **	13.939 **	12.994 **
** $p < 0.01$, * $p < 0.05$, N = 56.			

Table 2. Results of hierarchical linear modelling analysis (financial performance).

Variables	Dependent Variable: Financial Performance		
	Model 4	Model 5	Model 6
Firm Size	0.218 (0.043) *	0.147 (0.043) *	0.148 (0.043) *
Firm Age	-0.116(0.051)	-0.136 (0.049) *	-0.114(0.049)*
Manufacturing	0.145 (0.0123) *	0.121 (0.119) *	0.117 (0.0117) *
State ownership	-0.1 (0.125)	0.03 (0.132)	0.026 (0.13)
Green innovation		0.306 (0.0066) **	0.3 (0.065) *
Managerial environmental concern (MEC)			0.001 (0.057)
Green innovation x MEC			0.177 (0.044) *
R^2	0.166	0.231	0.256
F	11.175 **	13.599 **	11.825 **
** $p < 0.01$, * $p < 0.05$, N = 56.			

Moderating Effect Test - H2a predicts that the greater the managerial environmental concern, the stronger the positive effect of green innovation on operational performance. The results in Table 2, Model 3 demonstrate that managerial environmental concern positively moderates the association among green innovation and operational performance (β= 0.189, $p < 0.05$, $R^2 = 0.287$), supporting H2a. Furthermore, H2b projects that the greater the managerial environmental concern, the stronger the positive effect of green innovation on financial performance. As shown in Table 2, Model 6, the F-statistic is significant (β= 0.177, $p < 0.05$, $R^2 = 0.256$), thus the moderation effect is significant.

6 Discussions

The present research expands the existing theoretical and extant literature on two different bases. To begin with, the study provides a highly polished examination of the association which is there between organizational performance and innovation. Most scholarly studies have done previously tend to consider the performance of the firm as a concept that is unidimensional in nature [22]. In the present study, conceptualize performance of the firm as a multi-dimensional construct, that is, financial and operational performances.

Second, more research should be done to incorporate additional moderating variables, specifically organizational slack and the environment, to discover the connection between green innovation and firm performance [12] . From the extant literature, scholars have proposed that several factors (e.g., organizational, environmental, contextual, etc.) can influence the adoption of innovation towards performance [23]. The findings demonstrate a greater, healthy impact among the different green innovation as well as the relevant multi-dimensional constructs. Therefore, the researcher has consequently offered new insights to establish the ground into ways that may greatly impact on the financial as well as the operational performance of the individual firms.

The study findings affirm a positive impact of the environmental concern on the association between innovation and the subsequent firm performance. This clearly shows that the concerns of the managers on environmental regulations tend to play significant functions on the attitude of the firm towards applying green innovation. The planning of the organization to invest in further green innovation is usually impacted on by civil society, the government as well as customers. In the present research, the study has further integrated the individual research streams of organizational performance and green innovation by including the main moderating factor that changes the green innovation into the actual performance.

7 Conclusions

Green ecological programs usually offer major opportunities for the growth of the firm, including sustainability as well as enhanced performance. Majority of the organizations found in the developed countries have greatly benefited from relevant green activities and put themselves within the international arena to the disadvantages of organizations which are found in the third world countries. By reflecting on a scholarly study that did involve 12 different companies found in Bahrain, the present study has investigated the relationship which is there between firm performance and green innovation. The study has equally investigated the general interaction effects of managerial environmental concern on the relationship which is there between organizational performance and green innovation. The study findings have shown that green innovation has a great impact on the overall performance of the firm.

This study, therefore, offers an important contribution to the already existing body of scholarly literature. However, it is essential to mention that the study had a number of limitations. To begin with, it is not possible to generalize the study in the whole upcoming nations. The study result is only based on the context of Bahraini and not any other nation. Therefore, the benefits associate with green innovation on firm performance might only be limited to Bahraini and the surrounding regions. The study recommends further future research on the same topic but in some other countries, both developing and developed countries.

The other study limitation is that this was a cross-sectional study design and therefore, the result only present the situation on the ground at the time the study was carried out and not before or after. The researcher, therefore, recommends future study to examine the same variables using a longitudinal study design as they are more valid and reliable. Such studies need to include other relevant moderating variables that might impact on the relationship between firm performance and green innovation

Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this article.

References

[1] Gil, M. T., & Jacob, J. The relationship between green perceived quality and green purchase intention: a three-path mediation approach using green satisfaction and green trust. International Journal of Business Innovation and Research., **15(3)**,301.(2018). https://doi.org/10.1504/ijbir.2018.10010406

[2] Ifrim, A. M., Stoenică, I. C., Petrescu, A. G., & Bîlcan, F. R. The impact of green innovation on organizational performance: Evidence from Romanian SMEs. Academic Journal of Economic Studies., **4**, 82-88. (2018).

[3] Mecca, U., Piantanida, P., Rebaudengo, M., & Vottari, A. Indirect Green Façade systems: A proposal of a global performance indicator for in/out evaluation. Proceedings of the International Multidisciplinary Scientific GeoConference SGEM., **19(6/3)**, 467–474. https://doi.org/10.5593/sgem2019V/6.3. (2019).

[4] Tudor, C. Predicting the evolution of CO2 emissions in Bahrain with automated forecasting methods. Sustainability, 8(9), 923. (2016). https://doi.org/10.3390/su8090923

[5] Ovidiu, N., Ciprian, N., Ion, P., Sebastian, C., Cosmin, D., & Eduard, C. Innovation in Romanian SMEs and its impact on performance. International Association of Computer Science and Information Technology - Spring Conference. (2009). https://doi.org/10.1109/iacsit-sc.2009.134

[6] Xue, M., Boadu, F., & Xie, Y. The Penetration of Green Innovation on Firm Performance: Effects of Absorptive Capacity and Managerial Environmental Concern. Sustainability., **11(9)**, 2455 (2019).

[7] Huang. Jun-Jei. The Research of Building Competitive Advantage Through Green Human Capital and Green Innovation. Master Thesis, National Sun Yat-Sen University. (2011).

[8] Weag, Hun-Hung and Chen, Ja-shen and Chen, Pei-Ching., Effect of Green Innovation on Environmental and Corporate Performance: A Stakeholder Perspective, Journal of Sustainability., **7**. 4997-5026 (2015).

[9] Sterbrink, Philip and Westerberg. Peter. Developing Green Innovation Within 4PLS: Pursuing Green Logistics, Master Thesis, Hogskolan I Gavle. (2016).

[10] Ma, Y., Hou, G., & Xin, B. Green process innovation and

innovation benefit: The mediating effect of firm image. Sustainability., **9(10)**, 1778(2017).

[11] Li, Dayuan and Zhao, Yini and Zhang, Lu and Chen, Xiaohong and Cao, Cuicui, , Impact of Quality Management on Green Innovation, Journal of Cleaner Production., **170**, 462-470(2018)

[12] Ar, I. M. The impact of green product innovation on firm performance and competitive capability: the moderating role of managerial environmental concern. Procedia-Social and Behavioral Sciences., **62**, 854-864(2012).

[13] Goodwin University. What is Green Manufacturing? Goodwin College. (2019, November12) https://www.goodwin.edu/enews/what-is-green-manufacturing

[14] Kneipp, J. M., Gomes, C. M., Bichueti, R. S., Frizzo, K., & Perlin, A. P. Sustainable innovation practices and their relationship with the performance of industrial companies. Revista de Gestão., **26(2)**, 94-111 (2019).

[15] Tang, M., Walsh, G., Lerner, D., Fitza, M. A., & Li, Q. Green innovation, managerial concern and firm performance: An empirical study. Business Strategy and the Environment., **27(1)**, 39-51 (2017).

[16] Abdullah, M., Zailani, S., Iranmanesh, M., & Jayaraman, K. Barriers to green innovation initiatives among manufacturers: the Malaysian case. Review of Managerial Science., **10(4)**, 683-709 (2016).

[17] Lee, K. H., & Min, B. Green R&D for eco-innovation and its impact on carbon emissions and firm performance. Journal of Cleaner Production., **108**, 534-542(2015).

[18] Shipton, H.; Fay, D.; West, M.; Patterson, M.; Birdi, K. Managing people to promote innovation. Creat. Innov. Manag., **14**, 118–128 (2005).

[19] Liang, D.; Liu, T. Does environmental management capability of Chinese industrial firms improve the contribution of corporate environmental performance to economic performance? Evidence from 2010 to 2015. J. Clean. Prod., **142**, 2985–2998 (2017)

[20] Serrasqueiro, Z.; Nunes, P.M.; da Silva, J.V. The influence of age and size on family-owned firms' financing decisions: Empirical evidence using panel data. Long-Range Plan., **49**, 723–745 (2016).

[21] Borisova, G.; Brockman, P.; Salas, J.M.; Zagorchev, A. Government ownership and corporate governance: Evidence from the EU. J. Bank. Finance., **36**, 2917–2934 (2012).

[22] Al-Sartawi1, A. M., Al-Afifi, A. Badawi1, S., Hamdan, A., Reyad, S., and Elshaker, A. H. Joining the Green Movement: The Relationship Between Green Innovation and Business Performance. The 20th European Conference on Knowledge Management Lisbon, Portugal., 33-40. (2019).

[23] Kimberly, J.R.; Evanisko, M.J. Organizational innovation: The influence of individual, organizational, and contextual factors on hospital adoption of technological and administrative innovations. Acad. Manag. J., **24**, 689–713. (1981)