



IMPACT OF SUSTAINABLE ENVIRONMENT & GREEN TRANSFORMATIONAL LEADERSHIP ON FIRM FINANCIAL PERFORMANCE: A MEDIATING ROLE OF GREEN TECHNOLOGY

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KEYWORDS	ABSTRACT
Sustainable Environment, Green Transformational Leadership, Financial Performance, Green Technology, Mediation	This research aims to determine the impact of sustainable environment and green transformational leadership on financial performance of firms, while considering the mediation of green technology. Since sustainability is seen as more vital for organizations competing for an advantage, it is important to determine how these components interact. Using a deductive approach, cross-sectional quantitative research method is used, and data is collected from large number of firms in different industries practicing sustainability. The correlations and regression tests are employed to analyze relationships among variables. In light of results, early insights indicate that sustainable environments and green leadership have significant link with the financial performance, with the green technology as mediator. This research creates awareness on sustainability in business, and offer useful information that have immense advantages for organizational leadership & embrace green technology as way of attaining improved financial performance. The study brings future directions of research concerning sustainability of long-term consequences of diverse sustainability initiatives on financial performance in different contexts.
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INTRODUCTION

Over the period of last few years, the relationship between sustainability and business performance has attracted lot of interest across academic circles, practice, and policy domains (Niazi, Nisar, Nasir, Naz, Haider & Khan, 2023). The present world economy has been experiencing challenges such as climate change, depletion of natural resources, and social inequality among others; the result is that

managing sustainability in firms has become crucial more than ever (Gu, Shi, Wang & Xu, 2024). This change towards sustainability is not only moral or ethical imperative but, it is now inextricably linked to financial outcomes. Studying the literature revealed that issues of sustainability may be strategic managed for viable advantage, operational efficiency and overall financial performance (Awan, Jamil, & Gul 2023). Thus, integral to this discourse is the concept of green transformational leadership that postulates the leadership responsibility in sustainable change within organizations. In this linking, these leaders play a critical role in embracing the green technologies and practices which are useful tools in the realization of the sustainability objectives (Singh, Giudice, Chierici & Graziano, 2020).

The green transformational leadership helps in achieving organizational goals and objectives over responsibility towards the environment and the society and challenges employees to come up with green strategic solutions particular (Sun, Askary, Meo & Hussainm 2022). However, one cannot underestimate the effect of green technology that acts as mediator amid these two variables. Green technologies: solutions that deploy vast array of innovations to minimize negative environmental effects can be seen as the core of sustainability plans in many firms. Through application of green technologies productivity is increased through efficient use of the resources while minimizing costs hence improving organizational performance (Singh, Giudice, Chierici, & Graziano 2020). Thus, it seeks to establish effect of sustainable environment and green transformational leadership on firm financial performance with green technology moderator. Analyzing these aspects in synergy, the authors' purpose is to present the main idea of how sustainability strategies can donate to financial performance in current conditions of globalized business environment. It is our intent to offer useful information for managers, policy makers, and scholars who focus on sustainable development and corporate performance.

Problem Statement

Over the past decades, researchers have shifted their attention to understanding the 'bottom line' effect of sustainability initiatives and there is still considerable confusion on effects of sustainability on firm performance. There are research papers that demonstrate a positive relationship between the implementation of the sustainability considerations and financial performance, those that show contradictory patterns and even negative connections. This uncertainty poses problems to managers who wish to determine whether it is possible to invest in sustainability and in return gain significant financial benefits (Gu et al., 2024). In similar regard, notion of green transformational leadership is rather newly developed and there is therefore a dearth of research on the effects that the concept has on sustainability performances and financial performance in particular (Sun, Askary, Meo & Hussainm 2022). It is therefore important to understand how leadership can influence the change in organizations relating to management of the sustainable practices and green technologies. For that reason, if the role of leadership in this regard is not well understood, thus, the possibilities of firms developing the workable sustainability strategies that may be hampered (Singh, Giudice, Chierici, & Graziano 2020).

Furthermore, despite the past literature focusing on the link between sustainability and financial performance, mediating factors that give rise to this relationship are still ambiguous. Thus, for this

reason, there is need to advance knowledge on the moderating role of green technology in linking sustainable practices to better financial performance. Accenting effects of sustainability initiatives on the organizational financial performance is crucial so that organizations that seek to implement sustainability initiatives suitably can identify channels through which different green technologies can be effective. Also, it is crucial to note that improvements in the significance of sustainability as a determinant of financial performance might be contingent on the industry, geographical location or regulatory framework of business. Most of research works done previously fail to have richness of context and therefore, are not very useful to business managers when they attempt to implement the research findings in their organizations. The need is underlined in the fact that there is a lack for specific research taken with the account of various industry and geographical peculiarities to offer practical advice.

It is crucial to note that most of the research developments in the connection between sustainability and financial performance are cross-sectional in their methodology, which instantaneously provide a 'moment in time' perspective. As it has been discussed, there is a lack of longitudinal research that would consider the change in financial performance after the initiation of sustainability practices. It is therefore important to understand how this relationship changes over time for purpose of taking right decisions in terms of timing as well as the period of investment in sustainability. Studying the literature revealed that issues of sustainability may be strategic managed for the viable advantage, operational efficiency and overall financial performance. By answering above-mentioned problem statements this research intends to provide further insights into the integration of the environment sustainability, green transformational leadership, green technology and its impact on firm financial performance. Thus, the results may be useful for developing the business approaches, the leadership training, and governmental actions regarding sustainability and performance, to lead corporations to better practices.

Objectives & Hypotheses

1. To know about the relationship of sustainable environment and firm financial performance in the particular context.
2. To know about the potential relationship of the green transformational leadership and firm financial performance.
3. To understand the mediation role of green technology between sustainable environment and firm financial performance.
4. To understand the mediation role of green technology green transformational leadership and firm financial performance.

LITERATURE REVIEW

The industrial upgrade and development objectives of China looks to provide healthy environment for the digital business. This involves the further enhancement of digitalization in various industries, efficient use & management of resources within organizations and effective technological backing for promotion of digitalization of various fields (Ferrero & Aceituno 2015). It is the concentration on creation, effectiveness and sustainability. Through the digitalization of industries, China is creating a more robust economy that would be able to change course as adjustments are made on the global

marketplace but at same time, make sure it remains a dominant force in the international market (Guo, Wang, Hu, Wu & Lai, 2024). It also helps to shape strong ecosystem that is based on the use of digital technologies as key drivers of the economic growth (Singh, Giudice, Chierici & Graziano, 2020). Research has been conducted upon the antecedents of green transformational leadership in relation to green innovation and other factors. Still, there are limited research done on the impact that green transformational leadership has on environmental performance (Baah, Mensah, Afum & Armas, 2024).

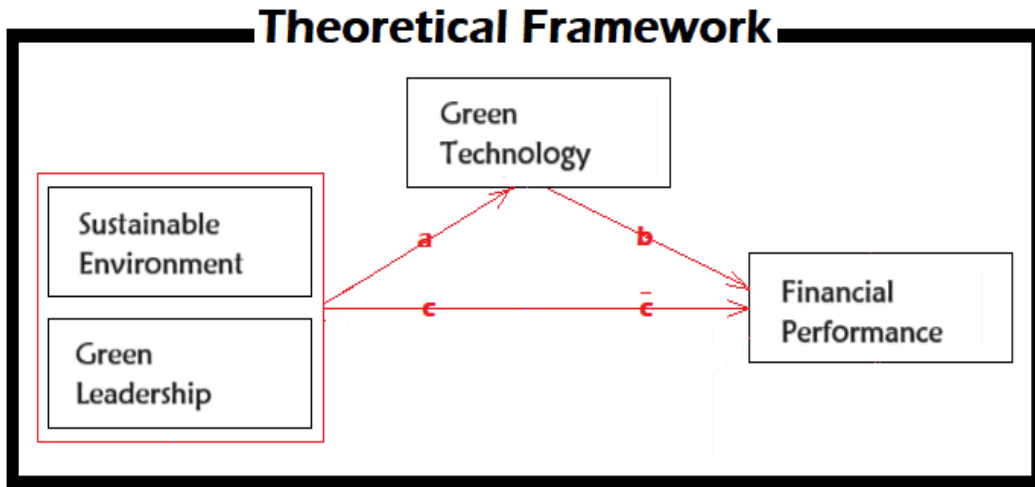
There is relatively scant debate on how green innovation and green human resource management might moderate link amid green transformational leadership & environmental outcomes (Ahmed, Alabdullah, Shaharudin & Putri, 2020). From literature discussed above, one can understand that the role of green transformational leadership is still under researched area, which means that more profound studies are needed in which, moreover to exploring direct effect of green transformational leadership on environmental outcomes, we should also look deeper into moderating role of green innovation and human resource practices (Gu et al., 2024). This work could further elucidate on the agreed research, in that, how organizational leadership & strategic management of organizational green change could be optimally done (Ferrero & Frias, 2015). They play crucial role in broadening scope of intervention for sustainable food systems, enabling them to encompass food environments (Baah et al. 2024, Li, He, Zhong & Xia, 2024). This study aim of exploring the associations between organization support, green innovation, green human resource management, green transformational leadership and sustainable business performance within the context of Chinese economy (Rehman & Hossain 2024).

China as the upper middle income developing world has also of late started focusing on sustainable development and environmental conservation (Gu, 2024). Accordingly, purpose is to analyze these factors and reveal their interconnections, which will help to understand essence of sustainability & competitiveness of Chinese businesses (Scafarto, Dalwai, Ricci & Corte, 2023). Over examining relationships, the study aims at establishing directions whereby organizational sustainable business performance in the Chinese context can be achieved by improving on leadership, innovation and Human resource practices (Nguyen, Van, Afifa & Nguyen, 2024). Recognition of organizational support on green initiatives is important for bringing the sustainable environmental and economic change (Singh, 2020). The implication could provide helpful suggestions for policymakers and line managers in China as they strive to enhance a competitive economy and minimize damage to the environment (Niazi et al., 2023). The green transformational leadership is present in workplace and greatly influences green performance (Chen, Wu, Hao, Yu & Streimikiene, 2024). Thus, analysis of non-green outcomes is equally relevant, which worsens standing of green outcomes (Tosun, Parvez, Bilim & Yu, 2022).

For this reason, GTL has been instrumental in discovering new leadership skill and capacities that advance sustainable management practices within corporate organizations while at the same time seeking to advance the interests of organization and attain maximum profits (Begum, Ashfaq, Xia & Awan, 2022). Even though, prior literature offers findings about impact of GTL on environmental

sustainability, little attempt is made to explore the role played by GTL on employee productivity in workplace (Lv, Shao & Lee, 2021). This study is set to respond to this research question; what is the effect of GTL on employee productivity? Knowledge of this relationship is important, on one hand, because it may show whether and how GTL can enhance organizational efficiency and effectiveness and, on other hand, whether it may contribute to reduced environmental impacts (Li et al., 2017). It is for this reason that study aims at establishing relationship amid GTL and employee productivity so as to give insights on how leadership strategies can be used to drive balance amid conservation of resources and perfection in workforce output (Singh et al., 2020). The outcome could help to expand the sympathetic of leadership and sustainability, and to provide recommendations for organizations that seek to apply sustainable practices in context of the firm performance (Khaddage, Yunis, Imran & Zeb, 2024).

Figure 1 Theoretical Framework



RESEARCH METHODOLOGY

This paper employs a deductive approach to explore the impact of the sustainable environment and green transformational leadership on a company's financial performance with a focus on mediating role of green technology. A quantitative research design was used, with a cross-sectional approach being employed to take data at one particular time, thus, allowing the examination of correlation among the variables. A record of the firms which signed up for sustainability events from different industries was done on their own, by using a stratified sampling method for equable representation of the sectors, such as the manufacturing, services, and finance. The data collection worked out with structuring the survey, distributing it to the key decision-makers, along with the use of secondary data to get financial and sustainability reports. A good part of the ethical considerations comes in with the right of participants to be informed and their responses to be kept in confidentiality. The study is intended to give worthwhile feedback about concepts of a nice environment and the green leader about firm financial performance that are done through the efficient and effective use of the green technologies.

RESULTS OF STUDY

Figure 2 Coefficient & T-Value

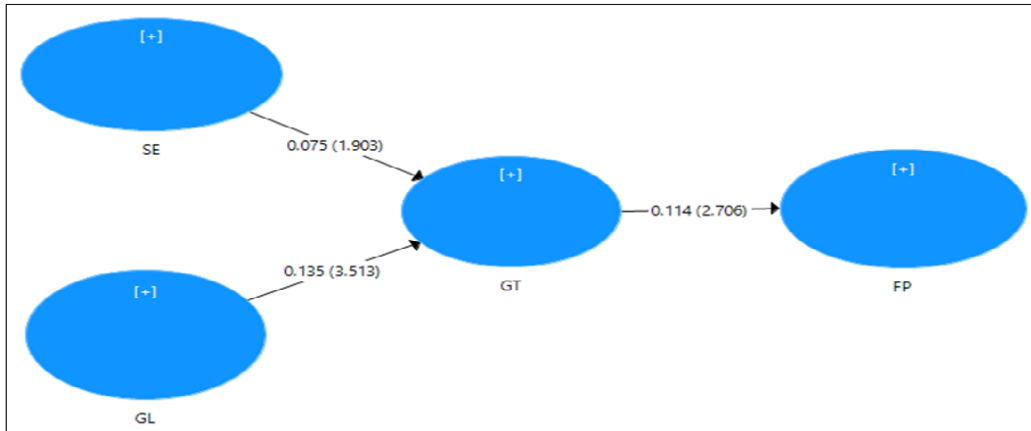


Figure 3 Direct Path

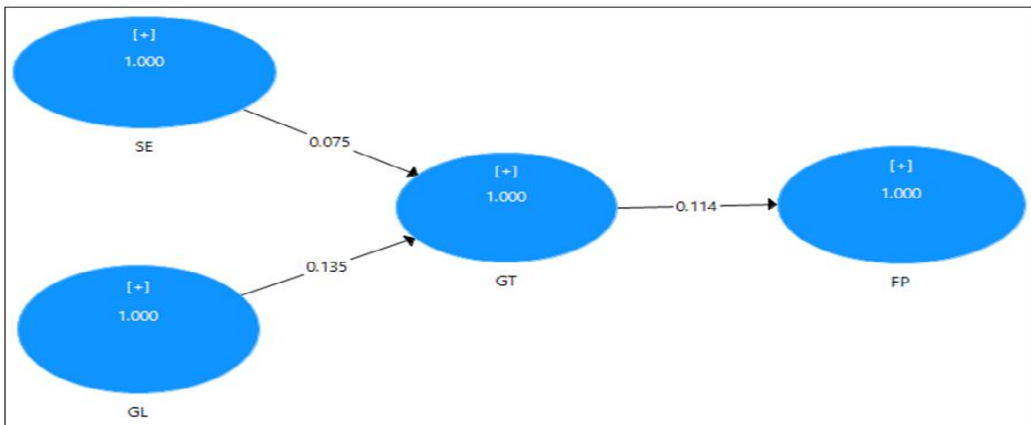


Table 1 Indirect Path of All Variables

	OS	SM	SD	TS	P-Values
GL -> GT	0.135	0.135	0.039	3.513	0.000
GT -> FP	0.114	0.110	0.042	2.706	0.007
SE -> GT	0.075	0.074	0.040	1.903	0.008

The table-1 provides statistical outcomes that evaluate the associations between Green Leadership (GL), Green Technology (GT), and Financial Performance (FP). The first relationship, GL to GT, shows strong positive effect with an original sample coefficient of 0.135. A T statistic of 3.513 demonstrates the validity of this relationship, as it is above the most commonly used threshold of 2. The P-value of 0.000 adds to reliability of the relationship, which suggests that effective green leadership is highly likely to be associated with adoption of green technology. The second relationship, GT to FP, also has a positive impact, with coefficient being 0.114. The T statistic of 2.706 indicates that statistical

significance is present, and the P-value of 0.007 supports this conclusion. In the end, relationship Sustainable Environment (SE) a favorable effect with a coefficient of 0.075. While the T statistic of 1.903 is barely below the usual threshold for significance, the P-value of 0.008 still shows that there is statistically significant relationship at the 0.01 level. This indicates that sustainable environment is positively linked to use of green technology, but the statistical backing is not as strong as in the other relationships. The results show that cultivating green leadership & sustainable environments can significantly boost the adoption of green technologies, which in turn leads to better financial performance for firms.

Table 2 Direct Path of All Variables

	OS	SM	SD	TS	P-Values
GL -> FP	0.015	0.015	0.008	1.827	0.008
GL -> GT	0.135	0.135	0.039	3.513	0.000
GT -> FP	0.114	0.110	0.042	2.706	0.007
SE -> FP	0.009	0.009	0.007	1.278	0.002
SE -> GT	0.075	0.074	0.040	1.903	0.008

The table-2 provides the statistical results which reveal the relationships among Green Leadership (GL), Green Technology (GT), Sustainable Environment (SE), and Financial Performance (FP). The first GL and FP relationship will be analyzed. The original sample coefficient is 0.015, while sample mean is 0.015, and standard deviation is 0.008. The T statistic of 1.827 shows that this relationship is not statistically significant at 2, which is conventional threshold, even though a P-value of 0.008 indicates some level of significance. This suggests that association amid green leadership & financial performance is positive, but not strong enough to be statistically robust. The correlation between SE and FP is 0.009. The T statistic is 1.278. This means that relationship is not statistically significant. On the other hand, P-value of 0.002 shows some significance, which is a weak positive relationship between a sustainable environment and financial performance. Finally, the SE and GT relationship has a sample coefficient of 0.075, a T statistic of 1.903, and a P-value of 0.008. The T statistic is just a little bit less than the usual level for significance, but the P-value shows that there is a statistically significant and positive relationship between the sustainable environment as well as the adoption of green technology.

CONCLUSION

This paper reveals the great importance of the sustainability of the environment and the impact of green transformational leadership on financial results of the firm, showing that green technology is the mediator. The results showed that green transformational leadership has a direct effect on the adoption of green technology and the promotion of financial performance. Thus, this implies that sustainability-focused leaders have the capability of successfully leading their organizations to the introduction of those green practices that will retain the financial benefits. In addition, the study emphasizes the creation of a sustainable environment as a primary aspect that enables the growth and application of the green technologies. Although the more direct link between the sustainable environments and financial performance was less strong, the indirect one still hints at the positive

connection thus reinforcing already existing idea that sustainability efforts can be of great benefit to business overall.

The present study is a contribution to the existing literature by providing empirical evidence of the interconnectedness between leadership, sustainability, and financial outcomes. It contends that the organizations looking to boost their financial performances should serve to capitalize in the green transformational leadership and sustainability culture. Thus, firms are not only able to raise their competitive edge, but they are also able to gain the trust of public which is increasingly demanding companies to adopt responsible practices that are environmentally friendly. Future research should be devoted to the investigation of the long-term impacts of these relationships through the various industries and contexts, as well as the possible moderating factors that could be the cause of the dynamics between leadership, sustainability, and financial performance. Overall, the findings of this research are instrumental for both practitioners and policymakers who are working towards the sustainability promotion in corporate sector, thereby drawing attention to importance of leadership and technology.

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