BRDR

Original Article

Access This Article Online
Quick Response Code

DOI
10.62019/BRDR.03.02.04

Volume: 3 | Issue: 2
Pages: 33-45

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How to Cite This Article
Ahmad, T., Ahmed, A., Nawaz, M., Mirza, S., & Hassan, R., U. (2023). Does Green Transformational Leadership Spur Economic and Environmental Performance through Green Product and Process Innovation: Mediation and Moderation Analysis. *Business Review of Digital Revolution*. 3(2), 33-45.

Received: 02-Aug-2023
Revised: 03-Dec-2023
Accepted: 15-Dec-2023
Published: 31-Dec-2023

Does Green Transformational Leadership Spur Economic and Environmental Performance through Green Product and Process Innovation in the Age of Digitalisation: Mediation and Moderation Analysis

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Abstract

This research investigates the impact of green transformational leadership (GTL), on economic performance (ECP) and environment performance (ENP), through the intervention of green product innovation (GPI) and green process innovation (GPRI) in the age of digitalisation and accessing the moderating role of stakeholder's pressure (SP). Quantitative and cross-sectional approach has been taken into consideration using Partial Least Square, Structural Equation Modeling (PLS SEM). Data for final analysis has been collected from textile sectors having an ISO-14001 certification. 120 ISO companies have been selected, located in Lahore, Karachi, and Faisalabad. The findings of the study have confirmed positive and significant relationship between GTL on ECP and ENP is partially mediated by the two mediators. This means that GTL not only directly affect ECP and ENP but also indirectly affect through GPI and GPRI. On the other hand, the relationship between GPI and ENP has been insignificant and hypothesis has been rejected.

Keywords: Green Transformational Leadership, Green Product and Process Innovation, Digitalisation, Economic Performance, Environmental Performance, Stakeholders Pressure.

1. Introduction

Currently, environmental deterioration is one of the pressing issue that world is facing and such environmental degradation is causing irreversible damages to environment and resultantly, impacts adversely economic stakes of enterprises (Liao and Zhang, 2020). From last many decades, several environmental issues have worsened to critical level which can lead to absolute calamity of environment. Thereby, it is significantly important to create awareness of these environmental issues and preventive measures (Ozturk et al., 2021; Sharif et al., 2020). Similarly, Sharif et al., and Sun et al., (2021) suggested that one of major problem to be tacked is environmental issues and these are not only challenging for developing economies but whole world is suffering.

An et al., (2021) indicated some of major environmental issues are pollution, deforestation, global warming, biodiversity loss, ozone layer depletion, public health issues, ocean acidification etc. Industrial revolution was considered to be one of major factor for environmental deterioration. In first stage of industrial revolution production was automated by hydraulic and steam power later stage incorporated electric power for production and utilized labor force. First two sources of energy in industrial revolution adversely impacted environment. Latterly, in third stage with emergence of technology automated manufacturing evolved which used electronics and information technology (Trauth-Goik, 2021). Currently, 4IR or industry 4.0 is fusion of artificial intelligence (AI), robotics, quantum computing, genetic engineering, and internet of things (IoT) etc., which are considered environmental-friendly. Environmental concerns have gained popularity due to global warming and pollution which consequently urge companies to proactively adopt green innovation in their processes and products (Chen, 2011). Globally, customers are becoming more aware of environmental concerns (Ding et al.,2019). Chen (2007) suggested that companies should implement environmental management system to build green image and competitive advantage. As customer awareness about environmental concerns

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increased so companies can create competitive edge through environment-oriented products (Chen & Chang, 2012; Razzaq et al.,2021).

Hasty economic growth has extensively caused environmental damage (Wang et al., 2021). Which consequently resulted in imposition of environmental regulation and restriction by various governments such as carbon emission regulation and taxes (Du et al., 2021). Internal and external pressure have pushed government and business entities to adapt environment friendly practices to neutralize or reduce adverse impact (Xu et al., 2021). This has turned into management practices that redesign business methods to compliance with regulatory requirements of reducing carbon emission and satisfying consumer environmental preferences (Wang et al., 2021).

Kammerer (2009) and Liao (2018) stated that firms choose green innovation primarily due to external pressure such as customer' requirements, regulatory compliance. However, most of firms react differently to such pressure in implementing green innovation. Despite the studies on external stakeholder pressure, internal factors such as leadership has gained much attention of scholars which spur implementation of green innovation. Being key creator of stakeholder's network, organizational leaders evolves as visionary and change agent for achieving organizational goals aligned with their vision (Maak and Pless, 2006; Pless, 2007).

Managers are adopting green transformational leadership that will not only significantly influences company's green innovation but also help to meet stakeholder's demands. Transformational leadership enhance development of innovation within business and vital for business success (Rehman et al., 2020). One of study in India conducted by Mittal and Dhal (2016) stated that transformational leadership has significant positive impact on organization's green creativity. Another study in Chinese context by Begum et al. (2021) showed strong association between transformational leadership and green innovation.

Developing countries such as Pakistan is also substantially facing environmental issues. Recently, IQAir (2021) report revealed major cities of Pakistan as most polluted cities in world. Although transformational leadership plays significant part in attaining in environmental sustainability, but still this area of research is less explored. Furthermore, intervening effects of green product and process innovation in the age of digitalisation between GTL and environmental, economic performance has not been explored extensively in research so far (Khan, 2016). So, current study aims to contributes in literature in many ways. Firstly, investigate impact of GTL on environmental and economic performance. Secondly, study has incorporated Green product and product innovation as mediator between GTL and environmental and economic performance. Finally, study has considered moderating role of external pressure on transformational leadership and environmental and economic. This study also offers practical implication to policy makers such environmental protection agencies in Pakistan and top management in companies.

The rest of paper is organized wherein upcoming sections presents theoretical frameworks and hypothesis, methodology, results, discussion, implication and limitation respectively.

2. Literature Review

2.1 Resource Based View (RBV)

RBV suggests that unique resources and capabilities (hard to replicate, valuable, and scare) are antecedents of competitive advantage and increase firm performance. Leadership is considered as unique resource which not only influence organization to achieve goals but also to gain advantage over competitors. NRBV stance is environmental factors have been neglected by organization in past, it must be accounted in firm strategic planning. Green transformational leadership motivate employees and firms to incorporate environmental behavior so pollution can be reduced and ultimately organizational environmental performance achieved (Barney, 1991).

Many scholars have shown in their study that green innovation is one of significant determine of sustainability and GTL considerably impacts GPI (Ahmed et al., 2020). Still, extensive research needed to draw a consistent conclusion on antecedents of green innovation (Awan et al., 2020).

Chen & Chang (2013) stated that GTL provides stimulation and comprehensible direction to organization to accomplish the ecological goals. Li et al., (2020) and Wang et al., (2018) suggested that GTL prominently minimize adverse effects of pollution on environment. The degree to which GTL impact organizational green innovation has been debated and understanding how firms and when GTL will be beneficial (Singh et al., 2020). As Chen et al., (2014) also stated that GTL may enable company to achieve green performance. Therefore, this study aims to investigate whether GTL can be helpful to organizations for achieving their GPI & GPRI and furthermore does GTL influence environmental and economic performance. Previous studies indicated that green innovation is considered as developing environment oriented products and processes (Chen at al., 2006). Environmental activism in corporation has resulted in green production and process innovation as a strategic agenda for management (Awan et al., 2019). Many of factors impacts organizational green innovation as Reiter-Plamon and Ilies (2004) indicated leadership mainly influence organizational innovation.

This study incorporated NRBV, Hart (1995) investigated the role of GTL on ENP and ECP thorough intervention of GPI & GPRI. The study has integrated and theorized insights from NRBV as it is significant in development of creative initiatives which results in innovative products and services that efficiently utilize natural resources. In the field of strategic management, NRBV is considered one of important theory, which examines product and process innovation to safeguard environment. Moreover, the theory associates firm resources and competencies with the natural environment (Cristina De Stefano et al., 2016). According to NRBV organization can add value to their process which are difficult to imitate by using human and structural resources (Rehman et al., 2021).

2.2 Green Transformational Leadership and Environmental Performance and Economic Performance

ENP is considered as initiatives taken by organizations to meet societal expectation with regard to natural environment (Chan, 2005). Chen et al., (2015) stated that environmental performance is not just a mere compliance with rules and regulation it is actually going beyond that. Environmental performance encompasses According to organizational procedures, outputs, and resource usage that complies with legal and environmental standards (Dubey et. al 2015). Numerous studies have shown that incorporating

sustainable practices into operations and product development, as well as using green goods, processes, and innovations, can improve the environment (Chen et al., 2015; Darnall et al., 2008; Oliva et al., 2019).

GTL influences organizational performance in multiple ways as enhancing creativity in employees, their engagement at workplace, and economic health (Barling et al., 2009). Ramus & Steger (2000) asserted that GTL positively influence firm green performance and psychological performance. Cop et al. (2021) revealed that GTL has positive impact on green work engagement, which ultimately impacts firm organizational performance.

Several authors have looked into environmental leadership and how it affects business success. Transformational leader with green behavior play a significant role in organizational sustainable development. Similar to this, Dubey et al. (2015) confirmed that environmental leadership has a positive effect on quality management and supply chain management, which in turn enhances firm environmental performance. GTL influences firm green identity, in that way firm green innovation improves (Pan and Tian's, 2017). Along with environmental aspects, GTL has also been associated with other benefits to organization: improves company image, boost employee motivation, better productivity and enhanced reputation (Ambec & Lanoie, 2008; Roy et al., 2001).

Thus, based on literature following hypothesis is proposed:

H_1: There is positive impact of GTL on firm (a) Green process innovation (b) Green product innovation.
H_2: There is positive impact of GTL on (a) firm environmental (b) Economic Performance**.**

2.3 Green Transformational Leadership (GTL) and Environmental and Economic Performance: Mediation of Green Product and Green Process Innovation In the Age of Digitalisation

According to NRBV leader is significant resource for environmental management in organization. Leader makes decisions and takes bold action which create conducive environment for employees by an example for subordinates Tuan, L. T (2019). In the field of environmental protection green transformational leadership is result of transformational leadership (Zhou, S.; Zhang, D.; Lyu, C.; Zhang, H., 2018).

The transformational leadership style is differentiated from conventional one because it considered as a change agent and influence creative work behavior (Jiang & Yang, 2015). In order to increase organizational creativity and productivity, establish vision-based motivational processes. (Bass & Riggio, 2006). GTL is actually leader's behavior which Encourage staff members (followers) to accomplish environmental goals and go beyond the call of duty in terms of environmental performance (Chen, Y.S., 2008).

Garcia-Morales et al., (2012) also supported that through their charismatic actions, transformational leaders persuade their followers to seek and successfully implement organizational change. Transformational leaders demonstrate positive behavior towards nurturing creativity which enable employees change and challenge status quo within organization.

Henker et al., (2015) stated that Transformational leaders exhibit behavior which allow their subordinate to have autonomy and pursue the common shared vision so that organizational creativity and innovation can be enhance.

GPI brings change or modification in product design by using environmentally friendly compounds during the process, which reduce adverse effect to environment and enhance energy efficiency (Lin, Tan, & Geng, 2013). Noci & verganti, (1999) stated that GPI requires organization to relook or fresh review of their product life cycle, from production process to distribution, and similarly from usage to disposal or recycling. Green product innovation more specifically referred to enhancing durability or recycling of products, selection of raw material that is suitable for environment and removal of dangerous components or compounds (Kivimaa & Kautto, 2010).

Whereas, GPI objective is to reduce energy usage during production process and wastage is converted into valuable product (Salvado et al., 2012). Specifically, reduction in air and water emission, reducing usage water and energy, and substituting fuel to environmental energy sources are included in GPI (Kivimaa & Kautto, 2010).

This study proposes following hypothesis;

H_3: Green process innovation significantly influences environmental performance.

2.3. Mediating role of Green Product and Process Innovation

GTL enhance organizational GPI & GPRI by encouraging employees to be creative at workplace to achieve higher performance level (Jung et al., 2003; Sarros et al., 2008).

So, it can be seemingly supported that GTL positively influence green innovation both product and process. The primary area of study that needs to be addressed is determining what factors have an impact on a company's level of green innovation. There is need to address this area because prior research has mainly focused on outcomes or performance of green innovation (Kraus et al., 2020). Yet, many other unexplored variables which encourage firm' green initiatives (Chen et al., 2018). Zhou J, Sawyer L and Safi A (2021) stated that innovation and changes encompasses changes in processes, workflows, and product. The identification of factors which cause changes in business process can enhance green innovation within organizations, by doing so this will not only be significant contribution in green literature but as well as significant practicality by encouraging companies transition towards greener future. Consequently, this perspective discusses how GTL can positively influence firm greater green innovation and then firm environmental and economic performance. GPI & GPRI considerably compensate negative impacts and enhance organizational performance through cost reduction (Del Giudice et al., 2018)

Since there hasn't been much discussion of GTL's function in fostering environmentally friendly products and processes to improve economic and environmental performance in the literature, the goal of this study is to clarify how GTL, as a corporate strategic tool, contributes to environmental protection. Therefore, study proposes following hypothesis based on prior literature.

H_{4a}: Green transformational leadership considerably influences environmental performance through green product innovation
H_{4b}: Green transformational leadership significantly influences environmental performance through green process innovation**.**

H_{4c}: Green transformational leadership significantly influences environmental performance through green process innovation.

2.4 Stakeholder theory

An individual or set of individually who can directly or indirectly influence decision of firm is considered as stakeholder (Freeman et al.,2010). Stakeholder theory mainly address two question: what is purpose of firm? What obligations does firm have towards their stakeholders? Firms are supposed to satisfy their stakeholders by answering those questions (Freeman et al., 2010). The NRBV states that company sustainable advantage over competitors depends on their internal resources which are valuable, rare, irreplaceable, and non-substitutable. (Barney, 2001). Several researches has used RBV and stakeholder perspective as theoretical lenses but integration of both lenses to examine sustainability in firm lacks in prior literature. This study has integrated stakeholder theory and resource based view to examine GTL, green process and product innovation and consequently its impacts on ECP & ENP in context of textile sector of Pakistan. Stakeholder theory conceptually holds that many internal and external stakeholders assert stress on companies to perform in a certain way (Sarkis et al., 2010).

Sodhi & Tang, (2018) suggested that there is lack of integration between two prominent theories namely Resource based view and stakeholder theory therefore it should be considered. Aragon et al., (2016) stated that pressure of stakeholders could be estimated by the actions within organization promoted by stakeholders such as state regulatory bodies, associations, and community, customer, supplier etc. The pressure that stakeholders exert on companies is measured by their capacity to influence choices (Kassinis & Vafeas, 2006; Fassin & Van Rossem, 2009; Helmig et al., 2016). Moreover, stakeholder's pressure has been vitally recognized as key driver of firm's efforts towards sustainability (Helmig et al., 2016). Stakeholder's pressure mainly driving adoption of Green practices in organizations such as green supply chain management (Sarkis et al., 2010), similarly Arulrajah & Opatha (2016) stated green human resource management, green marketing (Connelly et al., 2011) and so on.

2.5 Stakeholder's Pressure and Green Transformational Leadership

Stakeholder's pressure considered as one of key factor for environmental management (Dubey et al. 2015). Zhou J, Sawyer L and Safi A (2021) stated that management practices are formulated by leaders being principal decision makers and responsible for strategic planning. Leaders transform stakeholders' requirements into company processes and failure to compliance with stakeholder's requirement falls on leader's shoulders. Considering stakeholder's pressures leaders incorporate green values in their vision.

Qi et al., (2021) stated that principally leaders are recipients of external stakeholder's pressures and mainly drives company's response to those pressures and inspire organizational workplace to implement green practices. Moreover, Chen et al. (2018) revealed that stakeholder pressure positively influences green innovation. This study aimed to add to the growing body of research that stakeholder pressure is moderately correlated with GTL & ENP. This research will test following hypothesis:

H_5: Stakeholder's pressure moderate relationship between green transformational leadership and environmental performance such that the positive relationship is stronger when stakeholder's pressure is high rather than low.

3. Research Methodology

3.1 Sample and Data Collection

The research used a quantitative and cross-sectional approach to gather data from textile businesses in Lahore, Karachi, and Faisalabad that have ISO-14001 certification. A self-administrative questionnaire through purposive sampling was employed for data collection. From 120 ISO certified textile companies 278 managerial level responses were collected. There multiple reasons to include textile sector in our study. One of the key reason is textile sector is most vital sector in Pakistan' economic growth and contribute 57% to total export of Pakistan (Javed, 2019) and employ large labor force.

3.2 Measurement

The factors were assessed using a 5-point Likert scale, where 1 represented a strong disagree and 5 represented a strong agreement. Prior to including the scales in the final questionnaire, a pilot test was done to guarantee the validity and reliability of the questions. The final questionnaire is available with supporting material.

3.2.1 Stakeholder's Pressure

In this research scale for stakeholder's pressure is adopted from Dubey et al., (2015) and created with items such as "Is regional pollution board pressuring the company to adopt green practices".

Mainly study has incorporated two stakeholder's pressure one is regulatory pressure from environmental protection agencies and secondly from customer e.g. "Are foreign customer are more sensitive towards green practices".

3.2.2 Green Transformational Leadership

Similarly, study has used scale from green transformational leadership from Dubey et al., (2015) such as "Does company has well defined environmental policy". We have incorporated multiple aspects in questionnaire such as company policy about environmental, firm's support to environmental plans, well-communicated environmental policy among employees, and investment in environmental friendly technologies.

3.2.3 Green Product Innovation

The construct was measured using a recognized scale adopted from (Ar, 2012; Chen and Liu, 2019; Lin et al., 2013; Ma et al., 2018b Xie et al., 2019). It covers four aspects; replacing existing products or services through replacement with environmental friendly, labeling product with green product, sustainable packaging or green packaging, and recycling firm product to reduce hazard material wastage.

3.2.4 Green Process Innovation

The measurement of construct GPI is adopted from extensively used in prior literature (Cai and Li, 2018; Chiou et al., 2011; Salim et al., 2019; Xie et al., 2019). Mainly, this construct measures comprises of five aspects: switching to environmental friendly energy sources or reducing firm's energy consumption, adopting recycling

through technology and material recycling, upgradation of existing manufacturing processes and plants (machinery), investment in research & development for environmental protection facilities, and finally adopting and supporting green system in within organization.

3.2.5 Environmental Performance

Firm is environmental as dependent variable was measured using questionnaire adopted from prior studies of Chan et al., (2016), Long et al., (2017) Yook et al., (2018). It include five aspects in measurement; per unit reduction of water and energy consumption usage, compliance with environmental standard and enhancing compliance, leader among industry competitors for meeting environmental compliance, reduction in environmental accidents, reducing industrial wastage, and reduced environmental deteriorating material.

3.2.6 Economic Performance

Finally, environmental performance of textile company was measured using well established scale from study of (Dong et al., 2014; Huang and Li, 2017; Ma et al., 2021; Yook et al., 2018). Five aspects were measured such as; the profits of green products, sales turnover for newly introduced green products, operating cost, product quality comparative to competitors, and return on equity.

Furthermore, study has collected data on number of employees in firm, certification related to environmental and quality standards, and respondent designation.

3.3 Statistical Tool

This research has tested proposed hypothesis using Smart PLS 3 was used due to modern easy and compatible assessment technique. Mehmood et al., (2021) suggested to use Smart PLS 3 because of its modern assessment. According to Rasoolimanesh et al., (2018) model valuation includes two step process such as inner (structural) and outer (measurement) model. Khan et al., (2021) suggested that PLS-SEM considered as suitable analysis technique for testing and assessment of structural modeling. The rationale for use, according to Arian et al. (2020), is that less sample size is needed to ensure that the data are normal. Additionally, factor loading was assessed for construct validity and internal consistency reliability using the bootstrapping method.

4. Data Analysis and Findings

4.1. Measurement Model Assessment

The assessment of measurement model shown in fig 1 includes internal item reliability through outer loading of all items based on prior studies of (Hair, Sarstedt, Hopkins, & Kuppelwieser, 2014; Hair, Sarstedt, & Ringle, 2012; Hulland, 1999). The 3 items; one from economic performance, one from stakeholder's pressure and one from process innovation having outer loading below 7 were deleted. This was because those values were not within the acceptable range and that it could not be analyzed further. Cronbach alpha (CA) and Composite Reliability (CR) are mainly and commonly used estimator to measure internally consistent reliability as recommended in literature such as (Bacon et al., 1995; Peterson & Kim, 2013). As table 1 indicates all values are acceptable above 0.7 for CA and CR. Similarly, value of average variance is greater than 0.5 which consider acceptable as suggested by (Fornell & Larcker, 1981). Thus, all scales and factors meet the criteria of factor analysis.

Cronbach alpha for Economic Performance was 0.843, Environmental Performance was 0.861, GPI was 0.9, and GPRI was 0.911. For Stakeholders the value was 0.873 and Green Transformational leadership the value was 0.868. These values are within the threshold and can be further analyzed shown in table 1. Threshold values for AVE should be 0.5 or higher, which states that they fall within the range and are significant. Values have been shown in table 1. Economics Performance = 0.642, Environmental Performance = 0.609, Green Product Innovation =0.643, Green Process Innovation = 0.673, Stakeholder Pressure = 0.633 and green Transformational Leadership = 0.568. Table 2 are showing the square root values for AVE which are higher (diagonal value) than the off diagonal values (Fornell & Larcker, 1981).

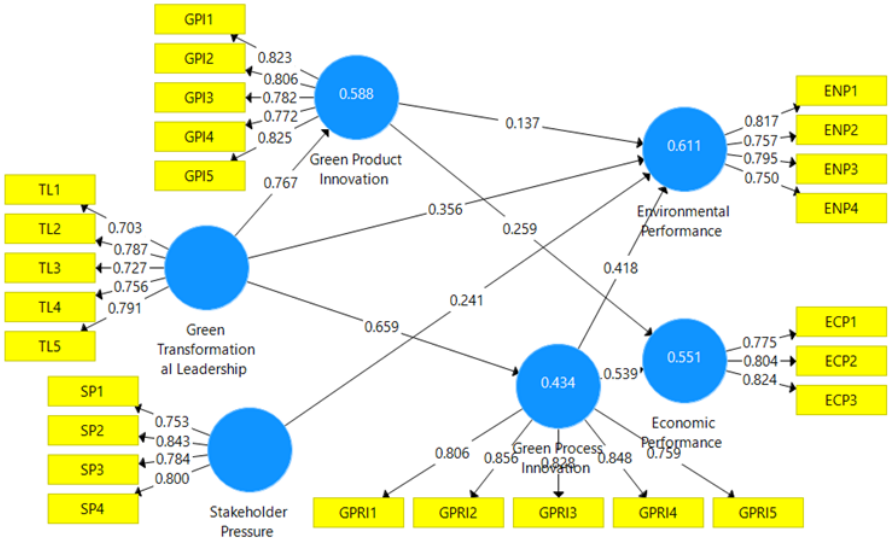

Figure 1. Measurement Model Assessment.

Note: ENP = Environmental Performance; ECP = Economic Performance; TL = Green Transformational Leadership; GPI = Green Product Innovation; GPRI = Green Process Innovation; SP = Stakeholder Pressure.

Table 1: Factor Loadings, Composite Reliability (CR) and Average Variance Extracted (AVE).

Constructs	Items	Loadings	Alpha	CR	AVE
ECP	ECP1	0.775	0.725	0.843	0.642
	ECP2	0.804			
	ECP3	0.824			
ENP	ENP1	0.817	0.786	0.861	0.609
	ENP2	0.757			
	ENP3	0.795			
	ENP4	0.75			
GPI	GPI1	0.823	0.861	0.9	0.643
	GPI2	0.806			
	GPI3	0.782			
	GPI4	0.772			
	GPI5	0.825			
GPRI	GPRI1	0.806	0.878	0.911	0.673
	GPRI2	0.856			
	GPRI3	0.828			
	GPRI4	0.848			
	GPRI5	0.759			
SP	SP1	0.753	0.807	0.873	0.633
	SP2	0.843			
	SP3	0.784			
	SP4	0.8			
GTL	TL1	0.703	0.809	0.868	0.568
	TL2	0.787			
	TL3	0.727			
	TL4	0.756			
	TL5	0.791			

Note: ENP = Environmental Performance; ECP = Economic Performance; TL = Green Transformational Leadership; GPI = Green Product Innovation; GPRI = Green Process Innovation; SP = Stakeholder Pressure
Source: Authors own estimation

Table 2: Discriminant Validity.

	ECP	ENP	GPRI	GPI	GTL	SP
ECP	**0.801**					
ENP	0.713	**0.78**				
GPRI	0.718	0.709	**0.82**			
GPI	0.631	0.583	0.691	**0.802**		
GTL	0.615	0.678	0.659	0.767	**0.794**	
SP	0.662	0.638	0.63	0.657	0.63	**0.796**

Note: Values in bold shows AVE square root
Source: Authors own estimation

4.2. Discriminant Validity: Fornell-Larcker Criterion

Discriminant validity variables for HTMT measurements by Henseler, Ringle, & Sarstedt, (2014) such as partial least squares, the Fornell-Larcker criterion and the examination of cross-loadings are the dominant approaches for evaluating discriminant validity. By means of a simulation study, we show that these approaches do not reliably detect the lack of discriminant validity in common research situations. We therefore propose an alternative approach, based on the multitrait-multimethod matrix, to assess discriminant validity: the heterotrait-monotrait ratio of correlations. We demonstrate its superior performance by means of a Monte Carlo simulation study, in which we compare the new approach to the Fornell-Larcker criterion and the assessment of (partial states that it also employs alternatives methods. The HTMT values should be less than 0.9, and 0.85. If the values are higher than 0.9 or 0.85 that states that, there are some problems, which have been detected, and needs to be solved in the latent variables. As shown in table 3, all values are within the acceptable range. There is not any problem detected.

Table 3: Heterotrait Monotrait Ratio.

	ECP	ENP	GPRI	GPI	GTL	SP
ECP						
ENP	0.774					
GPRI	0.883	0.839				
GPI	0.775	0.709	0.792			
GTL	0.785	0.843	0.77	0.714		
SP	0.858	0.795	0.746	0.786	0.768	

Source: Authors own estimation

4.3. Structural Measurement Model

According to Arian et al. (2020), the justification for use is that a smaller sample number is required to guarantee that the data are normal. The concept validity and internal consistency reliability of factor loading were also evaluated using the bootstrapping technique (Ramayah, Cheah, Chuah, Ting, & Memon, 2018). In answer to the criticism made by Hahn & Ang (2017) that p-values are a poor criterion for doing so, a combination of criteria, including p-values, confidence intervals, and effect sizes were used to evaluate the significance of the hypothesis. Table 4 and 5 are showing the direct and indirect relationship with moderating effect. On the other hand, fig 2 is showing structural model.

Table 4 states the direct effect, firstly GTL -> ENP β value is 0.316 (p >.001). GTL -> GPRI β value is 0.659. GTL -> GPI β value is 0.767. GPRI -> ECP β value is 0.539. GPRI -> ENP β value is 0.407. GPI -> ECP β value is 0.259. GPI -> ENP β value is 0.316. They were all significantly and positively related with ECP and ENP accept for GPI-> ENP (H_3). Therefore, hypothesis $H_{1\,(a,b)}$, $H_{2\,(a,b)}$, and $H_{4\,(a,b)}$ were supported and H_3 were not supported P value was 0.249 which was higher than the threshold value. On the other hand, moderating role of SP-> ENP was not supported; hypothesis has been rejected shown in table 4.

Following Preacher & Hayes, (2008) advice, bootstrapping the indirect effect was done to assess the mediation hypotheses. A substantial amount of mediation is present if the confidence interval does not cross a zero. As stated in table 5, GTL → GPRI → ENP (β = 0.268, P < 0.01), GTL → GPRI → ECP (β =0.355, P < 0.01), GTL → GPI → ENP (β = 0.111, P = > 0.01), GTL → GPI → ENP (β = 0.199, P < 0.01). Therefore, it has been seen that H_8 has been rejected. Shown in table 5.

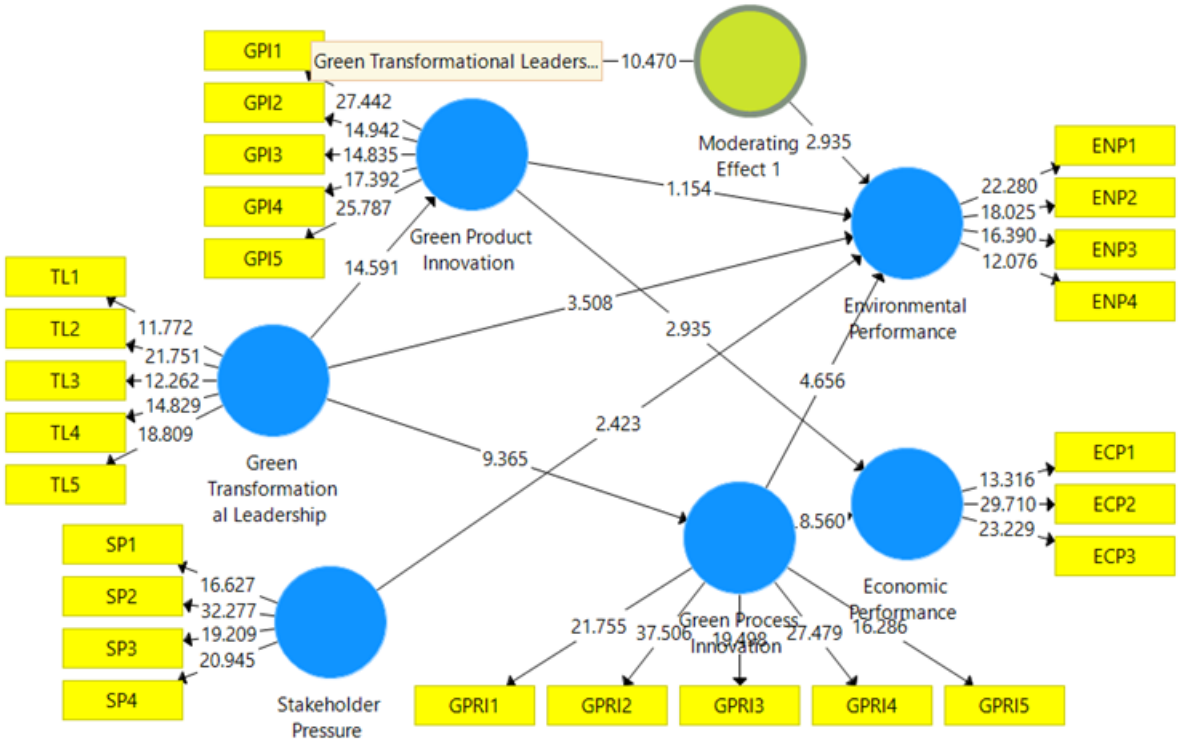

Figure 2. Structural Model Assessment.
Note: ENP = Environmental Performance; ECP = Economic Performance; TL = Green Transformational Leadership; GPI = Green Product Innovation; GPRI = Green Process Innovation; SP = Stakeholder Pressure.

Table 4: Direct Effect and Moderation.

	β	Mean	STDEV	T Statistics	P Values
GPRI -> ECP	0.539	0.541	0.063	8.56	0
GPRI -> ENP	0.407	0.404	0.087	4.656	0
GPI -> ECP	0.259	0.264	0.088	2.935	0.003
GPI -> ENP	0.144	0.142	0.125	1.154	0.249
GTL -> ENP	0.316	0.32	0.09	3.508	0
GTL -> GPRI	0.659	0.656	0.07	9.365	0
GTL -> GPI	0.767	0.768	0.053	14.591	0
Moderating GTL -> ENP	0.05	0.045	0.017	2.935	0.003
SP -> ENP	0.226	0.234	0.093	2.423	0.016

Note: A 95% confidence interval with a bootstrapping of 5,000 was used
Source: Authors own estimation

Table 5: Indirect Effect.

	β	Mean	STDEV	T Statistics	P Values
GTL -> GPRI -> ENP	0.268	0.262	0.051	5.307	0
GTL -> GPRI -> ECP	0.355	0.355	0.056	6.306	0
GTL -> GPI -> ENP	0.111	0.111	0.1	1.108	0.268
GTL -> GPI -> ECP	0.199	0.201	0.067	2.971	0.003

Note: A 95% confidence interval with a bootstrapping of 5,000 was use
Source: Authors own estimation

4.4. Moderating Role of Stakeholders Pressure

The graph in fig 3 shows the moderating effect of stakeholder's pressure between GTL & ENP. The linear regression in SPSS yields the un-standardized regression coefficients (i.e., **β**) of all factors. The independent variable is this study is Transformational leadership, therefore, un-standardized regression coefficient is 0.268 ($p < .001$). The second variable is the moderator between transformational leadership and economics performance and the un-standardized regression coefficient is 0.226 shown in table 4. In this case, hypothesis has been rejected. The result shows that the moderating effect is not strength the relationship between GTL and ECP. Hence, it shows a negative slope shown in fig 3.

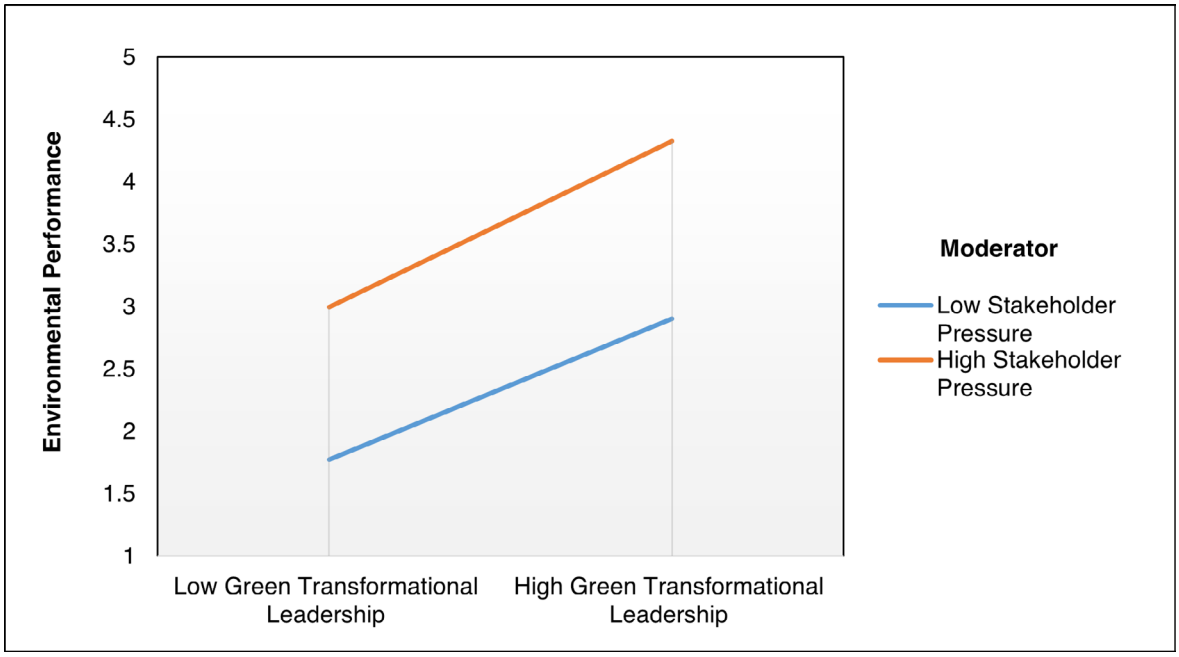

Figure 3. Moderation Effect of Stakeholder's Pressure Strengthen the Relationship between Green GTL & ENP
Source: authors own estimation.

5. Discussion and Conclusion

This study has examined the impact of GTL on environmental & economic performance and analysis of study enhances prior literature in which GTL influence environmental and economic performance through invention of GPI & GPRI. Moreover, green process innovation in the age of digitalisation does not affect economic performance (Ly, 2023). The result shows that this path is insignificant and hypothesis has been rejected. There are few research which has been conducted on GPI and ECP (Xie, Hoang, & Zhu, 2022). In this paper author have stated that there is a positive and significant relationship between the two. This is because the findings firmly establish the U-shaped relationship between green process innovation and firms' financial performance, according to which the financial performance of firms initially declines at a decreasing rate to reach a minimum before increasing at an increasing rate to recover.

Another study by Xie, Huo, & Zou, (2019), mentioned a positive and a significant effect of GPI and ECP. The reason behind was that GPI has a stronger positive effect on financial performance for companies with better green reputations, suggesting that GPI is more advantageous for companies. Unexpectedly, there is not enough research to support the idea that stakeholder's pressures have a moderating impact on the link between ECP & ENP and GPI & GPRI. Hou, Chen, & Xu, (2017) claim that because Pakistan's manufacturing sector has experienced comparatively little overall growth in green innovation and as a result lacks effective support and is subject to high risk and uncertainty. Additionally, given that environmental regulations in developing nations are subject to periodic change Dai & Zhang, (2017), manufacturers ought to produce more green goods.

6. Theoretical Implications

On perceived stakeholder pressure and environmental strategy, business type has been examined from a theoretical viewpoint using stakeholder theory in combination with a contingency perspective. Previous research has questioned who the key players are (Buysse & Verbeke, 2003; Eesley & Lenox, 2006; Fernández Gago & Nieto Antolín, 2004; Henriques & Sadorsky, 1999) and are affected by, the decisions taken by companies. They have varied and often conflicting interests, so it is essential for managers to know both who they are, and what are their attributes. This work has the aim of determining the main attributes of stakeholders with regards environmental issues, and how these attributes influence stakeholders' environmental salience (i.e. the attention and priority accorded to them by managers.According to this study, key players depend on a variety of variables. Compared to static industries, dynamic industries have more influential external main stakeholder groups, such as domestic and international customers and suppliers, and secondary stakeholder groups, such as domestic and international competitors and international agreements. There is no difference in the impact of internal main stakeholder groups and regulatory stakeholder groups between dynamic and static sectors.

So, in contrast to study that suggests stakeholder pressure should be considered as a single, constant set of pressures (Murillo-Luna, Garcés-Ayerbe, & Rivera-Torres, 2008; Sarkis, Gonzalez-Torre, & Adenso-Diaz, 2010) causally, by the level of training in companies. Theoretically, this relationship is supported by the relationship between institutional theory (stakeholder pressure. The findings of this study are consistent with earlier studies Buysse & Verbeke, (2003); Henriques & Sadorsky, (1999), which contend that stakeholder pressures can and should be divided into groups in order to more accurately assess external influences on perceived stakeholder pressures and the impact of particular stakeholder groups on other phenomena.

Furthermore, this study finds that business type has little impact on investments in environmental strategy. Although it was noted in hypothesis, set one that stakeholder views differed by sector, businesses did not adapt to these differences through intentional environmental strategies. Additionally, prior

research has theoretically and empirically examined the impact of perceived stakeholder pressures on environmental practises (Buysse & Verbeke, 2003; Eesley & Lenox, 2006), but very little of it has sought to pinpoint the factors that contribute to higher or lower levels of perceived pressure. This study advances existing stakeholder theory research by clarifying how specific stakeholder groups will affect the choice and application of environmental strategies depending on the industry circumstances.

7. Managerial Implications

The findings of this research have a number of important ramifications for managers and decision-makers. From a managerial perspective, it is important to note that the different interacting stakeholder groups result in a variety of environmental strategies. The variations depend on the industry the chosen company operates in. Managers need to be aware of the increasing stakeholder demand for environmental strategies in dynamic industries as opposed to static ones. In order to be able to satisfy these increased stakeholder demands, managers must have a clearly defined environmental strategy and make upfront environmental investments when competing in or choosing to compete in dynamic industries. Remembering that only a few environmental strategies are considered to be in demand from stakeholders is also very important. Companies that run in highly competitive industries should pay more attention to external primary and secondary stakeholder groups. Results indicate that despite these variations in perceived stakeholder pressure, companies did not adopt more strategic environmental strategies in this small sample.

This might present some management chances. Furthermore, companies are not responding strategically to these variations in shareholder demand. By making wise investments, inspiring their organizations to take the lead on environmental problems, and implementing a proactive environmental strategy to satisfy shareholder demands, managers could profit from this. The findings show that businesses have not yet made strategic environmental choices. This gives businesses the chance to gain competitive environmental benefits. To sum up this discussion, it can be said that businesses appear to be managing the environment poorly. Effective environmental management necessitates the identification of key stakeholders. These results also have some policy-related repercussions. According to this study, the type of business has little bearing on how much regulatory stakeholder pressure is felt.

In other words, regardless of the industry, management has a comparable perspective on rules and regulations (i.e., pressure from regulatory stakeholders). Findings show that companies in both dynamic and static industries regard regulatory stakeholders as equally essential or unimportant. Nonetheless, research indicates that companies in dynamic industries are more likely to make environmental investments because of perceived stakeholder pressure from the regulatory side (i.e., national and regional governments; local public agencies).

8. Limitations and Future research

This study, like other studies, has some restrictions that pave the way for additional investigation. First, it is a purposive sampling; future studies might consider a longitudinal technique. Second, by incorporating other leadership styles and their impact on green innovation in different sectors of the economy, scholars could replicate our conceptual model and ascertain whether the relationships still hold true or not. Third, the research concentrated on green innovation in general, including GPI & GPRI. It does present opportunities for future study to examine GPI & GPRI, and their antecedents separately. Fourth, we looked at green process and product innovation as key mediators between green transformational leadership and environmental performance. Future study is required to determine how and under what circumstances the connection between GTL and ENP could be improved. Last but not least, study has used stakeholder pressure as collectively whereas pressure can be separately investigated for different stakeholder i.e. regulatory, customer, supplier, competitor etc.. Therefore, we encourage researchers to look into how Industry 4.0 technologies can boost green innovation. Finally, yet importantly, we performed our poll in Pakistani textile industry. In order to confirm our findings, other researchers may examine these factors in the other industries and other contextual setting as well.

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