



RESEARCH ARTICLE

How the Leadership Style Influences the Firm's Sustainable Performance by Boosting Employee Satisfaction and Productivity: The Role of Green Organizational Culture

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ARTICLE INFO	ABSTRACT
Received: May 20, 2024 Accepted: Jun 22, 2024	Nowadays the effective leadership styles have significant for every nature of business as well as for environmental issues. Therefore, the study aims to examine the effect of transformational and transactional leadership behaviors on the sustainable manufacturing sector performance in Saudi Arabia, thereby testing the mediating influence of employee productivity and satisfaction. In order to achieve purposive sampling, data was gathered using an administration questionnaire that was given to 372 participants from sixty manufacturing organizations operating in different cities by online Google forms, emails, and WhatsApp. It is the research's objective to understand how the mentioned leadership styles affect sustainable performance and explore the role of the employee productivity, satisfaction, and the green organizational culture within the sector. The study used Smart-PLS (4. 0) and structural equation modeling (SEM) for detailed analysis on the collected primary data and for the integration of complex model validity for PLS-SEM that is core to assure a robust analysis and result interpretation. The findings show that the organizational transformational and transactional leadership and a green culture improve the sustainable performance of the organizations in the Saudi manufacturing sector. Further, the study also reveals that aspect of how employee satisfaction and productivity mediate the sustainability effectiveness. In sum, the presented observations highlight the centrality of leadership behaviors for enhancing long-term performance in the manufacturing context.
Keywords	
Transformational leadership	
Transitional leadership	
Employee satisfaction	
Employee productivity	
Green organizational culture	
Firm sustainable performance	
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INTRODUCTION

Over recent years, the vision 2030 has led to massive reorganization of the manufacturing sector in Saudi Arabia for sustainable growth and diversification of the economy. Leadership of an organization plays a critical role in improving firm performance especially on the issue of sustainability. An environmentally friendly company culture appears as a crucial factor in this regard. The environmentally conscious workplace culture align with the goals identified in vision 2030, however it also assistances in enhancing employees' morale while being environmentally responsible and sustainable. Therefore, this research aims to examine how Saudi Arabia manufacturing companies' productivity and employee satisfaction are enhanced in the long run when a strong green organizational culture is integrated with different leadership paradigms. Transformational leadership has been confirmed to increase the firm sustainable performance; it involves focusing on change, involving and inspiring others, and fostering an innovative and diverse

environment. This type of leadership helps in ensuring that employees formulate their goals in a way that they will also be working towards the company's environmental goals and sustainable performance (Jam et al., 201; Singh et al., 2020). Additionally, this leads to adoption of sustainable practices and formation of long term performance (Al-Serhan, 2020). Transformational leaders are better placed to manage the challenges of sustainable business strategies and apprehend higher long-term performance when they ensure that sustainability is integrated into the organizational strategic plans (Shahzad et al., 2022; Zain et al., 2023).

Furthermore, transformational leadership upsurges the sustainability performance of businesses through creating awareness and encouraging others to adopt sustainable and innovative systems. This, in other words, brings long-term productivity improvement in organization and welfare of the environment (Younis & Hussain, 2023). Conversely, transactional leadership style, which focuses on set activities, clear goals, incentives and consequences, leads to short term achievements. However, it often does not enable the systemic changes that are required for effective and inclusive development (Dong, 2023; Kanval et al., 2024). Transactional leadership affects the sustainable improvement of performance. This style might help achieve short-term goals, it may have little positive effect on sustainability if not supported by characteristic of transformational leadership which focuses on long-term planning and creative solutions (Piwowar-Sulej & Iqbal, 2023). Furthermore, the new focus on standards of environment, social, and governance as well as corporate social responsibility has shifted the relation among transactional leadership and sustainable firm performance. Transactional leaders can put into practice incentives to achieve a sustainable culture (Abbas, 2024, Rashid et al., 2023). Companies are beginning to realize that sustainability is vital for their operations in the future. Therefore, understanding how leadership affects the promotion of sustainable behaviors is imperative. Hence, it becomes crucial to assess the degree to which transactional leadership can adapt and transform the given organizational values beyond simple transactional dealings to determine its role in long term organizational success.

Worker satisfaction plays a crucial role in determining output and the victory of the organization. Satisfied employees are more prospective to be productive, committed, and enthusiastic in their work, thus enhancing the performance. Organizations that focus on the health of their employees have better performance, lower turnover, and higher creativity (Ansari et al., 2021). The positive interaction between increased levels of employee satisfaction and productivity and firm sustainability can be illustrated by the manner in which motivated and productive employees contribute to improving organizational maturity, resilience, innovative capacity, and resource management (Sypniewska et al., 2023). For instance, a meta-analysis established that content employees are productive, which is beneficial for the organizational financial performance. A green culture transforms a company into a more sustainable organization through increasing its sustainability performance, efficiency of resource usage and compliance with the rules and regulations that have environmental themes (Al-Hakimi et al. 2022). Additionally, a positive perception of a green culture can be attributed to satisfied employees who also provide more output and have positive special effects on the long term financial performance of the company (Wang, 2019).

Numerous studies have roofed the effects of leadership styles on firm performance (Goelzner, 2018; Piwowar-Sulej & Iqbal, 2023; Suryo et al., 2024), the association of the leadership styles and their influence on firm sustainable performance is complex and still not explored (Kanaana et al., 2024; Satar et al., 2024). Leadership is often connected to firm improved performance because of the focus on ideas, motivation, and creativity. Moreover, the mediating roles of employee satisfaction and productivity are not explored in context of transformational and transactional leadership and firm sustainable performance, especially in Saudi manufacturing firms. There should also be need of how transformational and transactional leadership, which focuses on maintaining steady performance with the formation of green organizational culture. Moreover, the role of a green organizational

culture and the link between employee satisfaction, productivity, and a firm's sustainable performance have not been explored in previous studies (Roscoe et al., 2019; Sypniewska et al., 2023). Our study fill this gap by examining that how different leadership style with leadership theories can be used to enhance organizations' sustainable performance, with the mediating role of employee's satisfaction and productivity and the moderating impact of green organizational culture. Thus, this research can provide useful information on how to improve leadership strategies concerning the environmental goals and firm sustainable performance.

This research seeks to answer the following questions;

- How transformational and transactional leadership styles influence the sustainable performance of the manufacturing sector in Saudi Arabia?
- In what way does the level of satisfaction among employees mediate the association among leadership styles and manufacturing sector's sustainable performance in Saudi Arabia?
- In what manner does the level of employee productivity mediate the connection of leadership styles and firm sustainable performance of the manufacturing sector in Saudi Arabia?
- This paper seeks to establish the moderating role of green organizational culture among employee satisfaction and sustainable firm performance in the manufacturing industry in Saudi Arabia.
- How is 'green organizational culture', as a moderator, influencing the association among employee productivity and firm Sustainable performance in the manufacturing Industries in Saudi Arabia?

The rest of the paper is arranged as next section pronounces the literature review. Section 3 concentrations on the research methodology and data measurement. Section 4 presents the results and discussions while section 5 discusses the conclusions of the study and policy implications.

LITERATURE REVIEW

A firm's long-term viability is influenced by the interaction between green corporate culture and the mediated relationships between leadership (both transactional and transformational) and employee productivity and satisfaction. Transformational leadership, described by intellectual encouragement, individualized consideration, and inspirational motivation, contributes to organizational sustainability by fostering an innovative climate that is ethical and has a long-term perspective (Northouse, 2021). This leadership model promotes flexibility and growth by aligning employee goals with organizational goals. However, transactional leadership, which focuses on the achievement of short-term goals, clear tasks, contingent rewards, and exception-based management, fosters operational efficiency and stability that is beneficial to organizational effectiveness (Abbas, 2024). The performance of the employees, their satisfaction, and the leadership styles adopted by the management determine the long-term success of a company. A positive and involved leadership culture increases employees' job satisfaction, strengthening their motivation and commitment, and increasing organizational effectiveness (Paais & Pattiruhu, 2020). Al-Swidi et al. (2021) argue that this culture enhances the effects of employee satisfaction and performance on organizational success by fostering common values of environmental and social stewardship.

Our study used the theories of organizational culture, Herzberg's Motivation Hygiene Theory, transformational and transactional leadership theory. The transformational leadership theory enhances performance in the long-run since it helps individuals to set their personal goals in line with the organization's vision, hence boosting commitment and innovation (Korejan & Shahbazi, 2016). Transactional leadership theory supports the existence of discipline in the achievement of the short-term goals resulting from well-articulated incentives as well as expectations (Antonikas & House, 2014). According to Herzberg's Two-Factor Theory, there are hygiene factors and motivators that need to be met in order to ensure employees' job satisfaction and motivation (Alshmemri et al.

2017). Organizational Culture Theory postulates that culture has a great impact on the attitudes and behaviors of employees, creation of sustainable innovation and flexibility and improvement of teamwork (Hatch & Zilber, 2012). These theoretical frameworks have been backed up by recent empirical studies that have revealed that corporate culture, employee performance, and leadership are interconnected in achieving long-term organizational success.

Transformational Leadership and Firm Sustainable Performance

This has been found to have a direct relationship with the growth of an organization in the long run through the use of transformational leadership. According to Aldhaheri & Ahmad, (2024), the fact that transformational leaders can often motivate their subordinates to work beyond the normal capacity may help the organization. In the study by Qalati et al., (2022), it was revealed that there is a positive connection among transformational leadership and business performance, innovation, and organizational commitment among the employees. Other studies by Cho & Kao, (2022) also played a big role in establishing the fact that transformational leadership is key in building a good and sustainable organizational culture (Asad, Asif, et al., 2023; Asad, Majali, et al., 2023). This sustainable culture may help the organization in accomplishing its strategic goals by enhancing the confidence, engagement and motivation of the employees for the goals of the organization. Transformative leaders can create a positive organizational culture that ensures that employees feel part of the organization and appreciate the importance of value congruence.

As pointed out by Burawat, (2019), it was established that there is a significant affirmative connection between the transformational leadership and the sustainability. This leadership style ensures that the organization embraces sustainable and lean management practices that lead to efficient resource utilization and environmental stewardship. To support this assertion, Shahzad et al., (2022), noted that the development of a sustainable corporate culture improves organizational performance through transformational leadership (Asad et al., 2024). In addition, the argument of leadership in the long-term performance is supplemented by the focus on knowledge sharing within the organization. From the study by Iqbal et al. (2020), the authors found that sustainable leadership is crucial for the firm's sustainable performance as it ensures the alignment of the ECOS objectives with the strategic plan of the firm. Some of the ASEAN countries have transformational leaders, and these leaders suggest that organizations should focus on stakeholder relations, innovation, and ethical behavior to produce commendable sustainable performance. According to Hidayat-ur-Rehman & Alsolamy, (2023), it was revealed that transformational leadership fosters change culture and innovativeness which in turn leads to the improved performance of SMEs in the future.

H1: Transformational leadership positively influence on firm sustainable performance.

Transactional Leadership and Firm Sustainable Performance

Transactional leadership has been a topical issue discussed in the area of corporate sustainability and the literature has indicated that it can have a positive influence on the performance of an organization in the long run. Transactional leaders are known to offer explicit direction, goals, rewards and punishments as a way of managing subordinates to ensure accountability at the workplace. This may lead to increased organizational performance and reduced employee turnover, as well as higher job satisfaction (Paais & Pattiruhu, 2020). Abbas, (2024) supports the concept of transactional leadership as most effective in motivating subordinates towards accomplishment of goals and objectives thereby boosting workforce performance and profitability. Moreover, Piwowar-Sulej & Iqbal, (2023) also found that transactional leadership can help in building the creative and innovative culture in the organization and hence may lead to the improvement in sustainability and competitiveness of the organization in the market. Feranita et al., (2020) stated that although there is a short and strong positive association between transactional leadership and SMEs sustainability in Indonesia. Transactional leadership that relies on rewards and consequences, as well as clear

processes and procedures, can be useful in supporting compliance with sustainable initiatives; however, it may be more challenging to sustain such initiatives over time (Adnan et al., 2023; ur Rehman et al., 2024; Wang et al., 2023).

According to the study by AlAbri et al., (2022), it was found that the transactional leadership that focuses on performance and work-related rewards and well-coordinated activities improves staff performance and their compliance with sustainable HRM practices. This type of leadership is most effective for the organization in the long run since it assists in the maintenance of high levels of performance among the workers. According to Changar & Atan, (2021), transactional leadership helps in promoting ethical and environmental objectives of CSR through organizational standards, rewards and penalties. The following is an explanation of how this strategy improves the sustainability of the organization: As stated by Kafetzopoulos & Gotzamani, (2022), the use of transactional leadership is beneficial for the organization in the long run as it encourages sustainable behavior in employees through policies, incentives, and consequences. This leadership styles sustain businesses by ensuring that only sustainable projects are executed in the organizations. Dai et al. (2022) noted that transactional leadership improves the long-term organizational performance by enforcing compliance with CSR standards through a well-structured reward and punishment system. This is the more organizational commitment that moderates the relationship among the leadership style and sustainable performance. Iqbal et al., (2020) in their study found that while transactional leadership offers the necessary framework and power to support sustainability initiatives, it does not necessarily lead to improved performance as much as transformational leadership does. In most of the ASEAN countries, the sustainability performance of companies is enhanced by transactional leadership, which is characterized by ensuring compliance with certain standards and achieving specific objectives.

H2: Transactional leadership positively influence on firm sustainable performance

Leaderships Styles and Firm Sustainable Performance: Mediating Role of Employee Satisfaction

Previous studies have found out that leadership styles such as transformational and transactional leadership have a great impact on the performance of a company in the long run. Transformational leaders engage and empower employees to excel, on the other hand, transactional leaders set performance expectations and rewards (Feranita et al. 2020). However, the effects of different leadership ideologies on the performance of enterprises are not always easily discernible (Khan et al., 2019). Literature review shows that satisfaction of the employees has been found to be positively associated with transformational leadership that results in enhanced organizational performance (Jiang et al. 2017). Conversely, transactional leadership focuses on maintaining order and attaining set goals, and helping organizations increase their long-term goals by putting in place procedures, incentives, and consequences. Such leadership philosophies may help organizations achieve their goals effectively and efficiently, which is important for their long-term sustainability (Paais & Pattiruhu, 2020). This relationship is greatly mediated by employee satisfaction because satisfied employees are more productive, committed, and motivated (Mahfouz et al., 2022). Several studies suggest that transactional leadership can enhance employee satisfaction since it creates a positive organizational culture through fair compensation, regular feedback, and recognition (Abdelwahed et al, 2023; Sutianingsih et al. 2023). Therefore, higher employee satisfaction leads to the better performance of the company; this, in turn, contributes to the long-term achievement of business strategies and results.

H3: Employee satisfaction has a mediating role between transformational leadership and firm sustainable performance.

H4: Employee satisfaction has a mediating role between transactional leadership and firm sustainable performance.

Leadership Styles and Firm Sustainable Performance: Mediating Role of Employee Productivity

In the present study, the link among leadership styles and long-term business performance has been confirmed, and the role of productivity as a mediator has been identified. The transformational leadership improves the performance of the workers for instance through creating motivation and engagement of the workers and making them active members of the organization and good citizens. This is because the performance and sustainability of an organization improves, thus increasing the productivity of the organization (Abdullah & Holida, 2023; Qalati et al., 2022). On the other hand, transactional leadership guarantees that there are laid down structures and motivation plans that foster the achievement of organizational goals and objectives. This approach will influence the quality culture within an organization and thus moderate the relationship between firm performance and leadership (Amin et al. 2023). Furthermore, the literature reveals that effective leadership and organizational culture enhances employee productivity and commitment. For instance, transformational leaders create a positive work culture that encourages employees to exceed their designated responsibilities, enhance the long-term business operations, and stimulate creativity (Abdullah & Holida, 2023; Kwarteng et al., 2024; Sayan & Sürücü, 2024). As a result, it is possible to conclude that both the transactional and transformational leadership paradigms are relevant in the context of the long-term development of organizations as they enhance employee performance through their engagement, motivation, and concentration on quality. This is because this approach makes sure that companies achieve their short-term objectives at the same time as building the foundation for their long-term success (Kloutsiniotis et al., 2023).

H5: Employee productivity has a mediating role between transformational leadership and firm sustainable performance.

H6: Employee productivity has a mediating role between transactional leadership and firm sustainable performance.

Employee Satisfaction and Firm Sustainable Performance: Moderating Role of Green Organizational Culture

According to the current research, organizational commitment is crucial when it comes to the realization of corporate sustainability particularly if environmental issues are considered as part of the organization's culture. Jibril & Yeşiltaş, (2022) have established that organizational sustainability is linked with employee well-being hence those employees who are happy are more engaged, committed, and motivated to make contributions towards the achievement of organizational objectives including the sustainability agenda. This paper argues that the integration of green organizational culture enhance employee satisfaction because it helps the employees to work in an environment that mirrors their attitude towards the environment (Tortia et al., 2022). These initiatives result to increased job satisfaction and employee motivation such as green workplace practices, green incentives and green training. Furthermore, a green organizational culture enhances this relationship and guarantees the employee's adherence to sustainability objectives by incorporating environmentalism principles into the organizational culture and everyday business processes (Morales-Huamán et al. 2023; Pape et al. 2023). More specifically, the effects of a green culture are even more significant in terms of employee performance and business performance. It is also important to note that the environmental sustainability in this organizational culture has a positive impact on the cost, efficiency and environmental performance. These settings assist employees to adopt sustainable behaviors that might result in improved creativity and efficient utilization of resources in future (Rosyanti et al., 2023; Shahriari et al., 2023). Organizational performance is to a large extent dependent on the performance of its employees; the high performing employees result in better organizational performance. This can be referred to as a green corporate

culture which facilitates environmentally sustainable practices and recommendations. It also enhances employee performance in a manner that is advantageous to sustainability objectives since it increases their interest in sustainable development (Novita Nurfitriyana & Muafi Muafi, 2023).

H7: Green organizational culture has a positive influence on firm sustainable performance

H8: Green organizational culture has a moderating role between employee satisfaction and firm sustainable performance.

Employee Productivity and Firm Sustainable Performance: Moderating Role of Green Organizational Culture
The association between employee productivity and firm sustainable performance through green organizational culture is an important area of study. Sharma et al. (2021) indicates that green organizational culture improves worker output because it creates an organizational culture that supports employees' values and fosters environmentally friendly behaviors. In this case, an organization is able to achieve its long-term objectives when there is alignment since the individuals within the organization work efficiently. These procedures lead to higher levels of creativity and production since they improve the abilities and the knowledge of the employees regarding the environment (Hastuti & Muafi, 2022). According to Chen et al. (2020), the use of green practices is likely to enhance the employees' support towards the company's environmental objectives. Consequently, productivity is enhanced. Also, green culture at the workplace encourages environmentally friendly behaviors which has been found to enhance production and workers' morale (Wang, 2019). This culture helps employees to participate in green initiatives which are key to the accomplishment of environmental goals and sustainable performance within the company. According to the findings Magsi et al., (2018), organizations that foster green cultures have higher employee productivity, enhanced environmental performance, and better long-term results. In conclusion, it is argued that Green HRM can enhance organizational performance and, therefore, sustainability through the development of a green culture. This association is focused on the integration of the principles of sustainability into the organizational culture and management systems for the purpose of enhancing firm sustainable performance.

H9: Green organizational culture has a moderating role between employee productivity and firm sustainable performance.

Conceptual Framework

The conceptual framework supports an empirical investigation of the presented connections within the model, which is displayed in Figure 1.

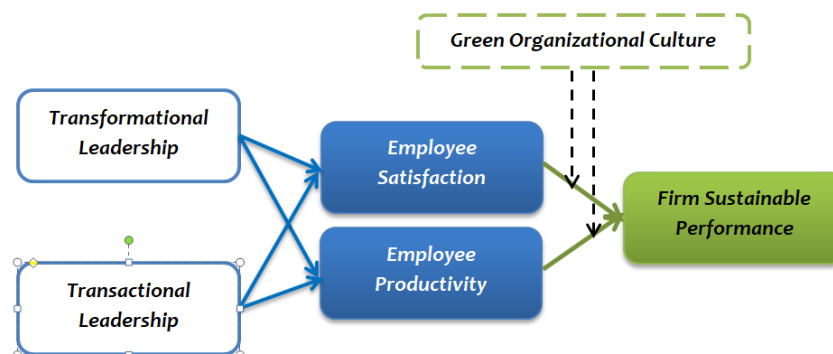


Figure 1: Research Model

RESEARCH METHODOLOGY

The present quantitative study aims to observe the influence of transformational leadership and transactional leadership styles on the sustainable performance of the manufacturing sector in Saudi Arabia. Moreover, explore the mediating role of employee productivity and employee satisfaction. A green organizational culture is significant for every business, especially in the manufacturing sector, due to the introduction of new rules and regulations regarding ecological issues. Therefore, the present study investigates how transformational and transactional leadership styles contribute to the sustainable performance of the firm and also examines the role of employee productivity, employee satisfaction, and green organizational culture in causing actions that contribute to the sustainable performance of the manufacturing sector in Saudi Arabia. Thus, the present study used the purposive sampling method and applied an administration questionnaire to a sample of 372 people of different levels of management from 60 manufacturing organizations in different cities of Saudi Arabia. The respondents were employed in an in an online Google form and sent it to them through email and WhatsApp. The target population of the current study is the total number of organizations operationalized in the manufactured sector of Saudi Arabia.

Measurement of scales

The present study employed a scale that was already attained earlier. There are two sections of the questionnaire. The first section contains demographic and personal information about the respondent, and the second section contains 36 questions regarding independent, dependent, mediating, and moderating constructs. Therefore, the present study employed a five-point Likert scale: 1 point specifies strongly disagreeing, and 5 points specify strongly agreeing. Transformational leadership style was evaluated by 7 items and getting from Singh et al., (2020) transactional leadership style has evaluated by 7 items which was adopted from AlAbri et al., (2022). Secondly, the green organizational culture was evaluated by 4 items, and these were obtained from Wang, (2019), and firm sustainable performance was evaluated by 8 items, and these were obtained from Mousa & Othman, (2020). Finally, employee productivity was assessed by 5 items and adopted from AlAbri et al., (2022), and employee satisfaction was evaluated by 5 items and obtained from Jibril & Yeşiltaş, (2022).

Table 1: Details of Construct and Items

Variable	Abbrev.	Items
Firm Sustainable Performance	FSP	8
Transformational Leadership Style	TFLS	7
Transactional Leadership Style	TSLS	7
Green Organizational Culture	GC	4
Employee Productivity	EP	5
Employee Satisfaction	ES	5

Data analysis procedure

The current study employed Smart-PLS (4.0) and suitable software for primary data analysis. The structural equation modeling (SEM) technique was used to analyze the cross-sectional data (Hair Jr. et al. 2017; Henseler et al. 2015). According to Hair et al.(2007), PLS-SEM allowed integration of complex model validity and, in this manner, permitted compliance in the process of analysis and interpretation of the findings. The procedure for PLS-SEM analysis is displayed in Fig. 2.

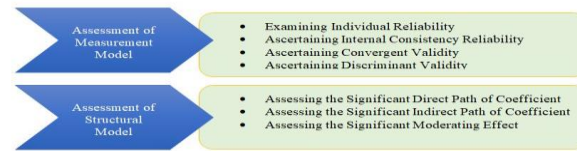


Figure 2: PLS-SEM Procedure

RESULTS AND FINDINGS

Demographics and descriptive statistics

Table 2 shows details about all of the respondents' data.

Table 2: Respondent data

Variable	Frequency	Percentage
Gender		
Male	218	58.60%
Female	154	41.40%
Age		
21-30	90	24.19%
31-40	132	35.32%
41-50	57	15.32%
51-60	93	25.00%
Education		
Bachelors	142	38.17%
Master	112	30.11%
M.Phil.	79	21.24%
PhD	39	10.48%
Management Level		
High Level	138	37.10%
Medium level	109	29.30%
Low Level	56	15.05%
Other	69	18.55%

Convergent reliability and validity

Table 3 displays the outcomes of convergent reliability and validity. For this purpose, the PLS algorithm method has employed to find the convergent reliability and validity of the items in the constructs. As pointed out by Hair et al.(2007) and Henseler et al.(2014), the minimum factor loading for each item was 0. 70, and the Cronbach alpha was 0.70. The composite reliability and AVE of each construct are higher than 0. 5, and the VIF of each item is not greater than 5. So, the finding suggests that the research model is valid and tested and does not present any multicollinearity problem.

Table 3: Results of convergent reliability and validity

Constructs	Items	Factor Loading	CA	CR	AVE	VIF
Green Organizational Culture	GC1	0.718	0.848	0.862	0.690	1.419
	GC2	0.857				2.025
	GC3	0.874				2.792
	GC4	0.864				2.486
Employee Productivity	EP1	0.873	0.842	0.875	0.621	2.605
	EP2	0.838				2.400

	EP3	0.895				2.780
	EP4	0.700				1.295
	EP5	0.692				1.522
Employee Satisfaction	ES1	0.779	0.714	0.833	0.512	1.058
	ES2	0.826				1.736
	ES3	0.815				1.932
	ES4	0.858				2.216
	ES5	0.685				1.465
Firm Sustainable Performance	FSP1	0.776	0.883	0.883	0.556	1.844
	FSP2	0.760				1.952
	FSP3	0.754				2.259
	FSP4	0.683				2.069
	FSP5	0.835				3.801
	FSP6	0.829				3.391
	FSP7	0.820				4.826
	FSP8	0.767				3.618
Transformational Leadership	TFLS1	0.789	0.940	0.941	0.736	2.770
	TFLS2	0.698				3.852
	TFLS3	0.803				3.649
	TFLS4	0.822				3.358
	TFLS5	0.745				3.530
	TFLS6	0.809				3.055
	TFLS7	0.796				2.726
Transactional Leadership	TSLS1	0.789	0.883	0.891	0.589	1.954
	TSLS2	0.698				2.064
	TSLS3	0.803				2.405
	TSLS4	0.822				2.516
	TSLS5	0.745				1.841
	TSLS6	0.809				2.143
	TSLS7	0.796				2.054
Average VIF Value						3.083

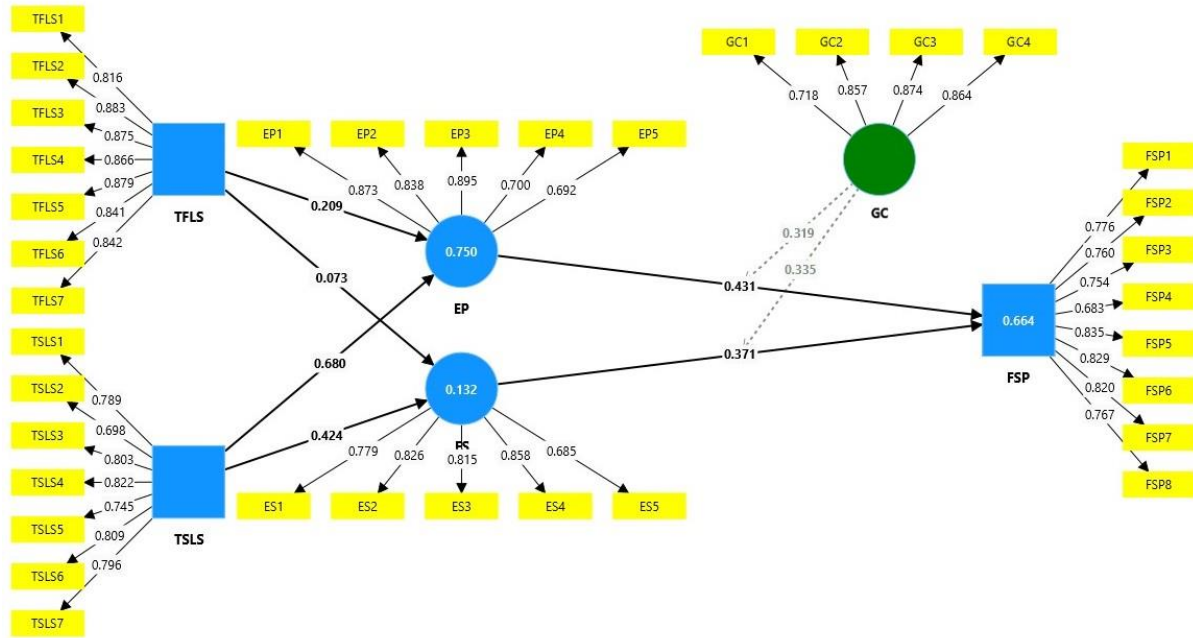


Figure 3: Measurement of Model

Discriminant validity

The primary goal of the current study is to discover the causal association among the constructs. According to Hair et al.(2017), discriminant validity is determined by the HTMT, Fornell-Larker criterion, and cross-loading methods. Thus, the present study engaged HTMT, the Fornell-Larker criterion, and cross-loading techniques to determine the discriminant validity.

Heterotrait-monotrait Ratio (HTMT)

According to Gold et al. (2001), the HTMT method is suitable to determine discriminant validity and also quantified that HTMT values should not be more than 0.85. The findings specify that there is no issue of discriminant validity because all values were below 0.85.

Table 4: Results of HTMT

	GC	EP	ES	FSP	TFLS	TSLS
GC						
EP	0.528					
ES	0.709	0.418				
FSP	0.748	0.734	0.774			
TFLS	0.516	0.681	0.357	0.719		
TSLS	0.580	0.781	0.428	0.686	0.732	

Fornell-Larker criterion

Furthermore, the present study is to determine the robustness of the research measurement model and the discriminant validity of the construct items. The Fornell-Larker criterion technique results

are displayed in Table 5. The findings indicate that the construct fulfill the criteria for discriminant validity.

Table 5: Results of Fornell-Larcker criterion

	GC	EP	ES	FSP	TFLS	TSLs
GC	0.731					
EP	0.466	0.788				
ES	0.726	0.336	0.715			
FSP	0.675	0.646	0.665	0.746		
TFLS	0.472	0.792	0.290	0.651	0.858	
TSLs	0.519	0.759	0.361	0.618	0.857	0.768

Cross Loading

Moreover, the cross-loading results are demonstrated in Table 6. Thus, the finding shows a validation of the construct items that encompass the construct scale of the studied model.

Table 6: Results of cross loading

	GC	EP	ES	FSP	TFLS	TSLs
GC1	0.718	0.305	0.672	0.507	0.270	0.416
GC2	0.857	0.494	0.649	0.655	0.514	0.529
GC3	0.874	0.337	0.548	0.461	0.354	0.346
GC4	0.864	0.379	0.534	0.580	0.392	0.402
EP1	0.383	0.873	0.295	0.572	0.705	0.761
EP2	0.394	0.838	0.208	0.570	0.665	0.706
EP3	0.508	0.895	0.343	0.630	0.728	0.799
EP4	0.307	0.700	0.260	0.381	0.448	0.485
EP5	0.187	0.692	0.212	0.323	0.524	0.581
ES1	0.105	0.005	0.779	0.002	0.113	0.007
ES2	0.587	0.341	0.826	0.646	0.355	0.332
ES3	0.633	0.279	0.815	0.504	0.221	0.309
ES4	0.580	0.255	0.858	0.539	0.179	0.293
ES5	0.518	0.165	0.685	0.391	0.131	0.194
FSP1	0.734	0.402	0.515	0.776	0.324	0.380
FSP2	0.705	0.420	0.677	0.760	0.370	0.411
FSP3	0.376	0.538	0.462	0.754	0.557	0.493
FSP4	0.366	0.448	0.353	0.683	0.543	0.504
FSP5	0.393	0.542	0.444	0.835	0.568	0.510
FSP6	0.455	0.483	0.501	0.829	0.513	0.470
FSP7	0.438	0.527	0.469	0.820	0.512	0.480
FSP8	0.440	0.469	0.442	0.767	0.504	0.424
TFLS1	0.425	0.636	0.294	0.526	0.816	0.654

TFLS2	0.419	0.688	0.226	0.576	0.883	0.722
TFLS3	0.430	0.719	0.219	0.601	0.875	0.761
TFLS4	0.422	0.714	0.275	0.559	0.866	0.790
TFLS5	0.354	0.652	0.232	0.523	0.879	0.723
TFLS6	0.385	0.689	0.205	0.560	0.841	0.762
TFLS7	0.397	0.652	0.290	0.557	0.842	0.729
TSLS1	0.217	0.548	0.219	0.231	0.510	0.789
TSLS2	0.305	0.591	0.179	0.291	0.526	0.698
TSLS3	0.413	0.684	0.220	0.583	0.853	0.803
TSLS4	0.410	0.686	0.313	0.548	0.722	0.822
TSLS5	0.476	0.583	0.314	0.493	0.557	0.745
TSLS6	0.396	0.755	0.277	0.532	0.685	0.809
TSLS7	0.526	0.734	0.387	0.567	0.709	0.796

Direct Relationship

The findings related to direct relationships or direct paths are determined by the PLS-SEM model. Table 7 demonstrates the results, and it is revealed that there is a significant and positive impact of transformational leadership style on firm sustainable performance of manufacturing sector in Saudi Arabia ($\beta = 0.163$, $T = 2.911$, and $p\text{-value} < 0.05$). According to the results, the first hypothesis has been accepted at a 5% significance level. The findings of the present study are aligned with prior research (Abbas, 2024; Shahzad et al. 2022). Additionally, the results exposed that there is a significant and positive impact of transactional leadership style on firm sustainable performance of manufacturing sector in Saudi Arabia ($\beta = 0.450$, $T = 7.925$, and $p\text{-value} < 0.05$). According to the outcomes, the second hypothesis is accepted at a 5% significance level. The findings of the present study are aligned with earlier research (Abbas, 2024; Iqbal et al. 2020). Furthermore, the findings discovered that there is a significant and positive impact of green organizational culture on firm sustainable performance of manufacturing sector in Saudi Arabia ($\beta = 0.227$, $T = 4.112$, and $p\text{-value} < 0.05$). According to the outcomes, the seventh hypothesis is accepted at a 5% significance level. The findings of the present study are associated with previous research (Al-Hakimi et al. 2022; Wang, 2019).

Table 7: Results of direct relationship

	Coefficient	Std. Deviation	T-statistics	p-values	Remarks
TFLS -> FSP	0.163	0.056	2.911	0.003	Supported
TSLS -> FSP	0.450	0.057	7.925	0.000	Supported
GC -> FSP	0.227	0.055	4.112	0.000	Supported

Mediation Effect

The findings linked to indirect relationships or indirect paths are determined by the PLS-SEM model. Table 8 validates the results, and it is exposed that there is a significant mediating effect of employee satisfaction between transformational leadership style and firm sustainable performance of manufacturing sector in Saudi Arabia ($\beta = 0.127$, $T = 3.175$, and $p\text{-value} < 0.05$). According to the findings, the third hypothesis has been accepted at a 5% significance level. Additionally, the results discovered that there is a significant mediating effect of employee satisfaction among transactional

leadership style and firm sustainable performance of manufacturing sector in Saudi Arabia ($\beta = 0.157$, $T = 4.267$, and $p\text{-value} < 0.05$). Thus, the fourth hypothesis has been accepted at a 5% significance level.

Furthermore, the results revealed that there is a significant mediating effect of employee productivity between transformational leadership style and firm sustainable performance of manufacturing sector in Saudi Arabia ($\beta = 0.090$, $T = 2.955$, and $p\text{-value} < 0.05$). According to the results, the fifth hypothesis has been accepted at a 5% significance level. The results revealed that there is a significant mediating effect of employee productivity between transactional leadership style and firm sustainable performance of manufacturing sector in Saudi Arabia ($\beta = 0.293$, $T = 7.458$, and $p\text{-value} < 0.05$). According to the results, the sixth hypothesis has been accepted at a 5% significance level.

Table 8: Results of Indirect Relationship/Mediation Effect

	Coefficient	Std. Deviation	T-statistics	p-values	Remarks
TFLS -> ES -> FSP	0.127	0.040	3.175	0.000	Accepted
TSLS -> ES -> FSP	0.157	0.037	4.267	0.000	Accepted
TFLS -> EP -> FSP	0.090	0.030	2.955	0.003	Accepted
TSLS -> EP -> FSP	0.293	0.039	7.458	0.000	Accepted

Moderation effect

The findings related to moderating effect of interaction paths are determined by the PLS-SEM model. Table 9 demonstrates the results, and it is exposed that there is a significant moderating effect of green organizational culture on the association between employee productivity and firm sustainable performance of manufacturing sector in Saudi Arabia ($\beta = 0.114$, $T = 2.771$ and $p\text{-value} < 0.05$). According to the results, the eighth hypothesis has been accepted at a 5% significance level. Furthermore, discovered that there is a significant moderating effect of green organizational culture on the connection between employee satisfaction and firm sustainable performance of manufacturing sector in Saudi Arabia ($\beta = 0.084$, $T = 2.882$ and $p\text{-value} < 0.05$). According to the results, the ninth hypothesis has been accepted at a 5% significance level.

Table 9: Results of Moderation Effect

	Coefficient	Std. Deviation	T-statistics	p-values	Remarks
GC x EP -> FSP	0.114	0.041	2.771	0.007	Accepted
GC x ES -> FSP	0.084	0.029	2.882	0.004	Accepted

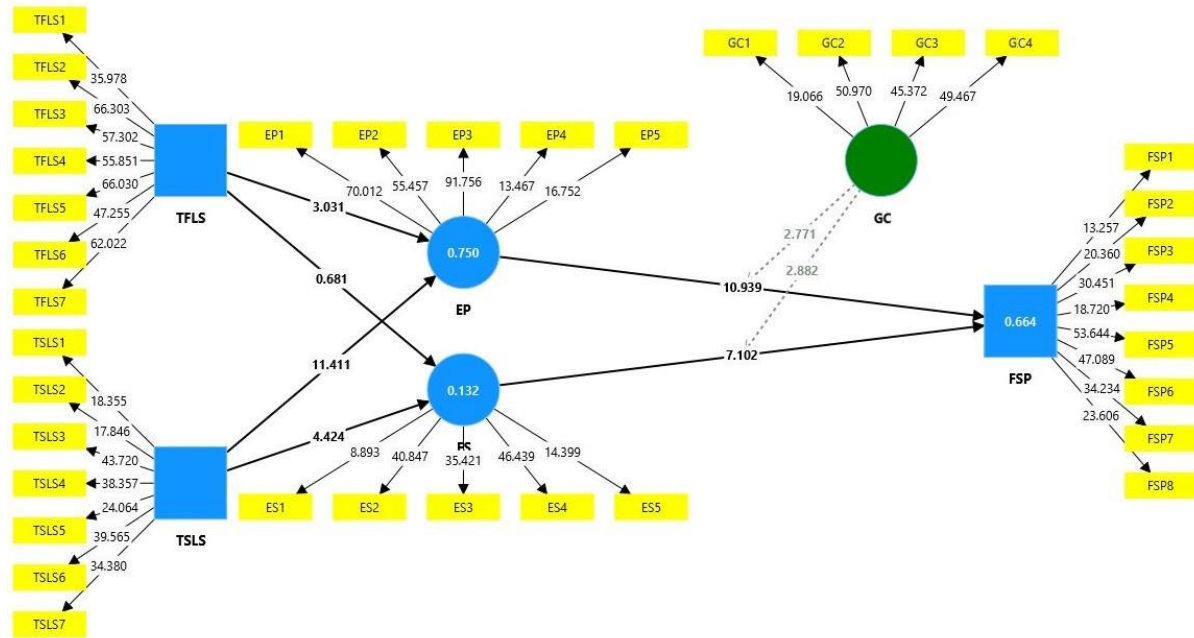


Figure 4: Structural equation modeling

DISCUSSION

Table 7 demonstrates the results revealed that there is a significant and positive impact of transformational leadership style on firm sustainable performance of manufacturing sector in Saudi Arabia According to the results, the first hypothesis has been accepted at a 5% significance level (Abbas, 2024; Shahzad et al., 2022). Self-organized learning is prominent in Saudi Arabian manufacturing companies, and this has a significant influence on sustainable performance with reference to transformational leadership. This practice both supports creativity and involvement, top-management perspective, flexibility, ethical standards of managers, and organizational climate. Taps into Saudi Arabia's Vision 2030 since the various strategies outlined here emphasize efficiency, sustainability, and the reduction of reliance on oil as the country's main export. Thus, integrating transformational leadership can improve performance indicators, cut through costs, and own differentiation. Furthermore, the results revealed that there is a significant and positive impact of transactional leadership style on firm sustainable performance of manufacturing sector in Saudi Arabia According to the results, the second has been hypothesis is accepted at a 5% significance level (Abbas, 2024; Iqbal et al. 2020). Transactional leadership style in the manufacturing sector also increase operating efficiency through defining organizational work requirements, setting rewards and sanctions systems, and measuring and evaluating subordinates' performance. They also promote reward, acknowledgment, and incentives; responsibility; flexibility; effectiveness; and responsiveness towards the employees.

Moreover, the results revealed that there is a significant and positive impact of green organizational culture on firm sustainable performance of manufacturing sector in Saudi Arabia. According to the results, the seventh has been hypothesis is accepted at a 5% significance level (Al-Hakimi et al. 2022; Wang, 2019). Green organizational culture assures and significantly enhances a firm's sustainable performance. Therefore, it will enhance the firm's ability to achieve environmental goals and objectives and optimize operations and competitive advantage whilst gaining legal compliance for its

operations, increase stakeholder engagement and capability for innovation and creativity, and attain better long-term sustainable performances of manufacturing sector in Saudi Arabia.

Table 8 demonstrates the results, and it is revealed that there is a significant mediating effect of employee satisfaction between transformational leadership style and firm sustainable performance of manufacturing sector in Saudi Arabia. According to the results, the third hypothesis has been accepted at a 5% significance level. This paper also establishes that employee satisfaction acts as a mediator between the connection between transformational leadership and sustainable organizational performance of the manufacturing sector in Saudi Arabia. Therefore, the work satisfaction and work commitment levels are increased as a result of leadership that inspires change and this in turn increases work productivity. These findings are accompanied by the observations and examples from existing literature on the fact that transformational leadership offers growth in employee satisfaction. As a result of employee satisfaction, that will enhance sustainable practices, thus making it necessary to embrace transformational leadership styles in the quest for sustainable practices.

Additionally, the results revealed that there is a significant mediating effect of employee satisfaction between transactional leadership style and firm sustainable performance of manufacturing sector in Saudi Arabia. According to the results, the fourth hypothesis has been accepted at a 5% significance level. The current study discloses that, indeed, the use of transactional leadership style among manufacturing organizations in the kingdom of Saudi Arabia will facilitate a positive change in the satisfaction levels of the employees and therefore result in better sustainable performance of the firm. For this reason, a structured work environment that is provided by transactional leaders enhances the satisfaction, which will in turn result in better performance and sustainability of the firm. This goes a long way to show why there is need for right and proper leadership style if sustainable improved performance is to be accomplished.

Furthermore, the results revealed that there is a significant mediating effect of employee productivity between transformational leadership style and firm sustainable performance of manufacturing sector in Saudi Arabia. According to the results, the fifth hypothesis has been accepted at a 5% significance level. The manufacturing sector of Saudi Arabia appears to be positively impacted by transformational leadership in a way that is extended by, and dependent on, employee productivity. Transformation leadership style enhances employee motivation, commitment, and creativity making it possible for the organization to record progress. This increases its effectiveness in production, quality, and creativity which are all core components of efficiency in organizations. These improvements tend to align with the elements of sustainability, like the minimization of wastes and the optimization of usage of various resources. Evidence obtained from authorities provides credence to this connection with a distinct emphasis on the need to embrace transformational leadership for growth in the manufacturing industry with endurance.

The results revealed that there is a significant mediating effect of employee productivity between transactional leadership style and firm sustainable performance of manufacturing sector in Saudi Arabia. According to the results, the sixth hypothesis has been accepted at a 5% significance level. The present study identify that productivity of employees has a more telling impact signifying how sustainable firms in Saudi Arabia manufacturing industries can be. Thus, transactional leadership style helps create structure in assigned tasks, specific goals, and clear rewards and consequences in order to improve the sustainable performance stimulate the employees' productivity. Thus, leadership behaviors conducive to performance and the promotion of high levels of performance work among employees are significant to developing sustainable performance.

Therefore, Table 9 demonstrates the results, and it is discovered that there is a significant moderating effect of green organizational culture on the relationship between employee productivity and firm sustainable performance of manufacturing sector in Saudi Arabia. According to the results, the eighth hypothesis has been accepted at a 5% significance level. The present study found that the effectiveness of the employee productivity in relation to the sustainable firm performance in Saudi Arabia manufacturing sector is in part moderated by a green organizational culture. The type of culture that this firm fosters, advocating for environmental responsibility, impacts employees' productivity and performance, and has consequences for the businesses' life and success, or lack thereof, in the future. Furthermore, shown that there is a significant moderating effect of green organizational culture on the relationship between employee satisfaction and firm sustainable performance of manufacturing sector in Saudi Arabia. According to the results, the ninth hypothesis has been accepted at a 5% significance level. The present study findings on Saudi Arabia manufacturing organizations show that the green organizational culture has moderating effect on the relationship between employee satisfaction and the firm sustainable performance. This indicates that sustainable performance is a function of satisfaction, but this ability depends with the organizational concern for sustainability; organizational sustainability defines their sustainability and success.

CONCLUSION

This study investigates the impact of transformational and transactional leadership styles on the sustainable performance of the manufacturing sector in Saudi Arabia. It also explores the mediating role of employee productivity and satisfaction. The study uses a purposive sampling method and administers an administration questionnaire to 372 people from 60 manufacturing organizations in different cities. The respondents were employed through online Google forms and sent via email and WhatsApp. The study aims to understand how these leadership styles contribute to sustainable performance and the role of employee productivity, satisfaction, and green organizational culture in the manufacturing sector. The study employed Smart-PLS (4. 0) and appropriate software for data analysis through a cross-sectional SEM. PLS-SEM made it possible to integrate the model validity issues into the analysis and interpretation of the results. Therefore, the study finds that transformational leadership style, transactional leadership style, and green organizational culture all have a positive impact on the sustainable performance of the manufacturing sector in Saudi Arabia. The study also reveals that employee satisfaction and productivity moderate the sustainability of the sector. In conclusion, the study reveals that leadership styles have a significant role in enhancing sustainability in the manufacturing industry.

Policy implications and future directions

The current study has also found that both transactional and transformational leadership types are crucial in Saudi Arabian manufacturing firms to enhance organizational performance in terms of fostering green culture and satisfaction and productivity of workforce. Leadership that entails change or the promotion of change is transformational leadership and it has the potential of fostering innovation and support for environmental issues. While transactional leadership guarantees that employees understand the necessity of setting sustainability goals and follow them, focus is placed on structures, rewards, and performance incentives. To enhance these benefits, the following recommendations should be made: companies should train their leaders in both the transformational and transactional models and emphasize sustainability principles. Policies should be aligned toward environmental objectives and people's engagement, including employees, in environmental activities. Some of the best strategies include developing and implementing work family policies, acknowledging employee initiatives towards sustaining the firm and organizations, and incorporating green indexes into performance management systems. The research directions for the future are the studies of the regional models of leadership, the utilization of the technology for

leadership as environmentally friendly, the cooperation with industry, the partnership with other academic institutions and organizations and the lobbying for government subsidies. By implementing these strategies, the sustainable performance will be improved and employee satisfaction increased, and Saudi Arabian manufacturing companies on the cutting edge of efforts to build sustainable competitive advantage.

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