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Influences of transactional and transformational leadership on social, environmental and operational performance

Influencia del liderazgo transaccional y transformacional en el desempeño social, ambiental y operativo

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Abstract: leadership style influences the organizational performance of the companies that manage it, and the current research relates it to economic and operational performance, disregarding social and environmental variables. This study examines a structural equation model that connects transactional and transformational leadership with social, operational, and environmental performance using six hypotheses that quantify the relationship between these variables. The model's hypotheses were validated, and a questionnaire was designed and administered to production managers in the Mexican maquiladora industry. A total of 156 valid questionnaires were obtained, and the information was entered into SPSS v.24 software for cleaning and validation. The model was evaluated using the partial least squares method to present a sensitivity analysis based on conditional probabilities for high and low situations in the concepts. The results show that both types of leadership influence the three types of performance. However, transformational leadership has a greater influence than transactional leadership on performance. Therefore, it is concluded that due to the nature of the maquiladora industry, it is better to invest resources in developing transformational leaders who have greater vision and inspiration and empower, motivate, and develop their staff.

Keywords: leadership, organizational performance, structural equations, human resources.

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Resumen: el estilo de liderazgo influye en el rendimiento organizacional de las compañías que gestionan y actualmente, hay investigaciones que lo vinculan con el rendimiento económico y operativo, desconsiderando variables sociales y ambientales. Este estudio analiza un modelo de ecuaciones estructurales que relaciona el liderazgo transaccional y transformacional con el desempeño social, operativo y ambiental mediante seis hipótesis para cuantificar la relación entre esas variables. Se procedió a validar las hipótesis del modelo, se diseña y aplica un cuestionario a administradores de procesos productivos de la industria maquiladora mexicana. Se obtuvieron 156 cuestionarios válidos, cuya información fue capturada en el software SPSS v.24 para su depuración y validación. El modelo fue evaluado con el enfoque de mínimos cuadrados y reporta un análisis de sensibilidad basado en probabilidades condicionales para escenarios de ocurrencia altos y bajos en los constructos. Los resultados reportan que ambos liderazgos influyen en los tres desempeños. Sin embargo, el liderazgo transformacional mostró una mayor influencia que el transaccional en cada desempeño, por lo que se concluye que, debido a la naturaleza de la industria maquiladora, es mejor invertir recursos en desarrollar líderes transformacionales que tengan mayor visión e inspiración, empoderen, motiven y desarrollen a su personal.

KPalabras clave: liderazgo, desempeño oganizacional, ecuaciones estructurales, recursos humanos.

Introduction

Leadership is "the ability of an individual to influence, motivate, and empower others to contribute to the effectiveness and success of the companies of which they are a part" (Carreiro and Oliveira, 2019). This definition shows that leadership style affects market performance and that leadership is as essential as any other company resource (AlNuaimi *et al.*, 2021). Leadership is not simply about holding a managerial position; it encompasses a set of skills, behaviors, and strategic vision that influence organizational performance (Jiang and Ali, 2024). Therefore, it is necessary to invest in resources to develop leaders at all levels and thereby achieve organizational transformation. There are two widely documented leadership styles: transactional (TSL) and transformational (TFL) (McClanahan, 2020).

TSL is the foundation of success, as leaders focus on day-to-day operations to achieve organizational goals (Martin, 2017). This style works well when the company is relatively stable (Aga, 2016), and the priority is the supervision and control of followers. In TSL, rewards or punishments are applied to followers based on the results achieved in the activities performed (AlNuaimi *et al.*, 2021). However, if the company is in the process of renewal, this leadership can have negative results because it focuses more on quantitative performance, thus neglecting qualitative performance. This approach adopts conservative, habitual, and reactive attitudes rather than proactive and innovative ones, incentivizing followers through their interests and requirements (Arokiasamy *et al.*, 2015; Laohavichien and Weerasai, 2025).

On the other hand, TFL influences followers through inspiration, motivation, and empathy (AlNuaimi *et al.*, 2021). TFL has a positive impact on organizations and also influences followers on a personal level (Martin, 2017), as the leader's role is to act as a mentor who supports, develops, trains, and nurtures followers, presents a shared vision, and establishes trust and security (Yue *et al.*, 2019). TFL facilitates business renewal because it promotes change, empowers employees, and fosters a relationship based on empathy, charisma, and loyalty. Therefore, they act emotionally, and several studies have linked this type of leadership to emotional intelligence (Chatterjee and Kulakli, 2015). In addition, TFL creates and improves organizational culture, helping followers to put their individual needs aside in favor of the collective and corporate good. In addition, empirical evidence confirms that TFL is more effective for organizations (Park and Pierce, 2020), improving employee satisfaction and organizational culture, which are key factors for productivity and effectiveness (Aferi *et al.*, 2023). Manufacturing companies are key entities for economic development and have an impact on the global economy; however, due to intense competition, product diversity, and market uncertainty, they must focus on strengthening organizational performance.

Leadership style is a critical element in organizational performance, which refers to a company's ability to achieve its objectives effectively and efficiently. This principle includes

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various dimensions that analyze how an organization achieves results in different essential areas, some of which are operational, social, and environmental.

Leaders adopt leadership styles that allow them to create participatory, trusting, and collaborative environments, resulting in more cohesive teams focused on achieving strategic objectives. In addition, these styles facilitate alignment between individual and organizational goals and promote a greater sense of purpose and belonging among employees. Specialized literature has shown that effective leadership has a positive impact on key metrics such as operational efficiency, job satisfaction, and talent retention (López González, 2024).

On the other hand, an inappropriate leadership style generates conflict, low motivation, and an unproductive work environment, and affects organizational performance. For example, autocratic leaders with poor communication skills limit innovation and organizational performance growth and encourage poor decision-making, as they do not seek feedback from other team members and reduce the organization's ability to adapt to dynamic environments (Sharma, 2022). In contrast, leaders who prioritize employee development promote continuous learning and drive short-term performance and resilience in the face of challenges (Deng *et al.*, 2023). Therefore, leadership style positions as a key pillar for achieving and maintaining high levels of performance in organizations.

The impact of leadership style on organizational performance has been thoroughly analyzed in various settings. For example, a recent study reported a systematic review and meta-analysis of the relationship between leadership and performance (Bonini *et al.*, 2024), another study was conducted in the oil and gas production sector in Ghana (Anyigba and Lartey, 2024), and research was conducted on leadership style and sustainable performance in Sierra Leone (Kebe *et al.*, 2024), and another study considered ethical, cultural, and social aspects of leadership and its performance in Jordan (Alkhadra *et al.*, 2023).

Specifically in Mexico, the manufacturing sector is renowned for its highly skilled workers, with 2,702,116 jobs nationwide, 481,786 in Chihuahua, and specifically in Ciudad Juárez, where there are 24 industrial parks and 328 manufacturing companies, generating 322,787 jobs (IMMEX, 2023), many of which are managerial positions that refer to leaders. However, despite the relevance of this industrial sector, there is little research analyzing leadership styles, as they are explored in a general way. For example, the impact of leadership on job satisfaction has been analyzed (Lara Bárcenas *et al.*, 2023), as well as how it can be a factor that generates flexibility and resilience in supply chains (Solis *et al.*, 2023), ignoring leadership styles and how they impact operational, social, and environmental efficiency indices.

This study contributes to covering this area of research, seeking to quantify the influence of TSL and TFL on the operational (DO), social (DS), and environmental (DE) performance of Mexican maquiladora companies. The results of this study will allow managers to know which leadership style favors them in achieving the objectives of the companies they run.

TSL mobilizes human resources through constant control and monitoring to achieve established objectives (Aga, 2016). Specifically, the contingent reward (CR) dimension establishes the exchange of tangible and intangible resources, such as incentives or professional recognition, which improves motivation and creates worker loyalty to the company (Fletcher *et al.*, 2019). On the other hand, leaders who use active management by exception (AME) create an environment of trust to monitor followers' progress in achieving established goals, thereby increasing job satisfaction (Sandstrom and Reynolds, 2020). Thus, because both dimensions of TSL have a positive influence on employees, which helps to create a good working environment and a sense of commitment and loyalty that in turn benefits the organization, the following hypothesis can be established for the Mexican environment:

H_1: TSL directly and positively influences DS in the Mexican manufacturing industry.

For this study, the passive management by exception (PME) dimension is eliminated because the literature review has shown that it has negative results on organizational culture, as it decreases staff satisfaction and contributes negatively to the creation of a safe work environment (Flatau-Harrison *et al.*, 2020).

In recent decades, social responsibility has captured the attention of academics (Soler-Sanchis *et al*., 2025). In TFL, the dimension of intellectual stimulation is present in the CEOs of companies, where it promotes the development of social responsibility strategies, as it focuses on participating in social issues (Waldman and Siegel, 2008). TFL improves satisfaction and increases participatory engagement because the motivation is not economic, but rather personal fulfillment (Jiménez, 2018). In general, leaders who apply for TFL are mentors who go beyond maintaining systems and focus on renewing companies in all areas and creating a shared vision. Therefore, the following hypothesis is proposed in the Mexican context:

H_2: TFL has a direct and positive influence on DS in the Mexican manufacturing industry.

TFL and TSL have been analyzed, along with their impact on innovation and green procurement in the United Arab Emirates, which contribute to promoting sustainable markets (AlNuaimi *et al*., 2021). The results indicate that TSL and TFL do not impact green procurement, but they do impact innovation, which enhances green procurement and improves environmental sustainability. On the other hand, in Pakistan, the effects of ambidextrous leadership (TSL and TFL) on governance mechanisms and social sustainability in manufacturing industries were studied, and it was found that ambidextrous leadership is related to improved environmental sustainability, and special attention should be paid to TSL because its absence significantly affects ecological sustainability (Awan *et al.*, 2018).

TSL focuses on routine activities, following procedures, and maintaining the *status quo* (Martin, 2017), and supports compliance with environmental requirements. Therefore, it is established that:

H_3: TSL directly and positively influences DE in the Mexican manufacturing industry.

TFL influences the ecological management and enthusiasm of workers in China with the aim of boosting corporate ecological creativity. The findings indicate that TFL has a positive and significant impact on ecological creativity, ecological human resources, ecological management, and the ecological enthusiasm of workers (Jia, 2018). Furthermore, TFL can influence human resource management, ecological practices and innovation, and environmental performance (Singh *et al.*, 2020). This is because the TFL style can improve employee behavior and, in turn, achieve organizational environmental goals (AlNuaimi *et al.*, 2021). Thus, given that TFL promotes a change in mindset and helps followers achieve high morale, and creates a shared vision in favor of organizational performance, the following hypothesis is proposed for the Mexican environment:

H_4: TFL directly and positively influences DE in the Mexican manufacturing industry.

A study conducted in the construction sector in South Africa investigated leadership styles and project achievement. The findings point to a positive correlation between TFL and TSL and project achievement, in contrast to autocratic and *laissez-faire* leadership styles, which had no relationship (Liphadzi *et al.*, 2015). In addition to this, it has been mentioned that DO improves through TSL-AME (İşcan *et al.*, 2014), and a study conducted in Ethiopia reported that the CR dimension of TSL is positively related to project success (Aga, 2016). Furthermore, senior management TSL is positively associated with internal integration in companies (Birasnav and Bienstock, 2019).

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In Turkey, leadership and its influence on DO through knowledge management and how it affects organizational innovation and corporate spirit were examined (Uslu *et al.*, 2015). The findings indicate that TSL increases these two variables, and it can be considered that project achievement and innovation are components of a company's DO. For this reason, the following hypothesis is suggested for the Mexican context:

H_5: TSL has a direct and positive impact on DO in the Mexican maquiladora industry.

On the other hand, a study analyzes all the characteristics of TFL and its impact on the adoption and diffusion of innovation, such as new technology and mobile cloud computing. The results indicate that intellectual stimulation and individualized consideration of TFL are strongly related to the adoption of innovation and mobile cloud computing, and make the company more efficient (Carreiro and Oliveira, 2019). Likewise, research was conducted on the relationship between TFL and TSL with internal integration, supplier companies, customers, and the implementation of advanced technology. The results indicate that TFL and advanced manufacturing technology in manufacturing companies are positively related to customer integration (Birasnav and Bienstock, 2019).

In addition to this, another study effectively examines TFL and TSL in relation to process and product innovation, as well as understanding acquisition capacity in China, and reports a positive impact of TFL on product and process innovation (Chang *et al.*, 2015). Furthermore, they pointed out that the components of intellectual stimulation, idealized influence, and inspirational motivation lead to a promotional approach in achieving project objectives, which is associated with a higher quality system and fewer delays. Therefore, the following hypothesis is established in the Mexican environment:

H_6: TFL directly and positively influences DO in the Mexican manufacturing industry.

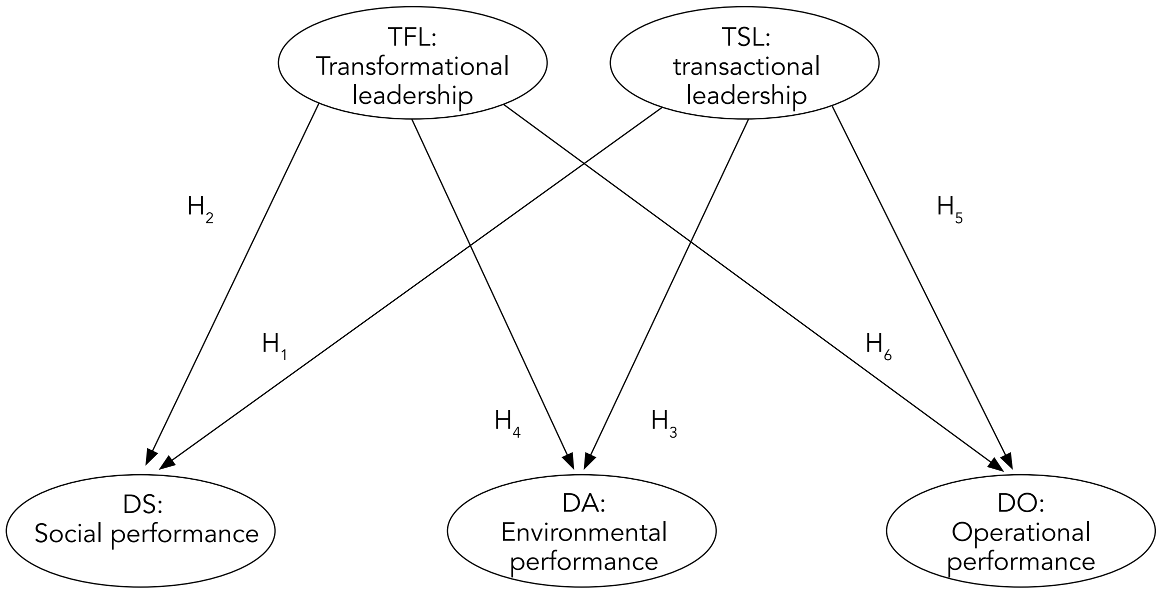
Figure 1 graphically illustrates the six hypotheses established.

Materials and method

A literature review was conducted using keywords such as TSL, TFL, and organizational performance, focusing on articles published from 2015 onwards to identify the items in the latent variables and create the questionnaire, which consists of three sections. The first section is intended to collect demographic data from the respondent, the second section establishes the TFL and TFL items, and finally, the third section inquires about DO, DE, and DS.

The initial questionnaire was validated by eight judges, five maquiladora industry executives, and three academics. After the two stages with the judges, the final instrument was generated, adapted to the geographical context of the Mexican maquiladora industry, and all items were answered on a five-point Likert scale, where one equals never, two is rarely, three is frequently, four is almost always, and five is always. See the appendix for the complete questionnaire.

Figure 1
Proposed model



The online questionnaire was administered via the Google Forms platform to engineering managers and supervisors working in the manufacturing industry who lead work groups and are confirmed leaders. The information was collected from June 20 to October 20, 2024. All respondents had to lead at least three teamwork projects to evaluate their performance.

On October 21, 2024, a database was downloaded and analyzed using SPSS v.25® software. The data was then cleaned, identifying extreme values to avoid bias in the analysis, and the values of each observed variable were standardized. It is important to note that absolute values greater than 4 were considered extreme values because they were distant points, so they were replaced by the median (Kaneko, 2018). Next, uncommitted respondents were identified using the standard deviation of each survey, and values lower than 0.5 were removed from the analysis (García-Alcaraz *et al.*, 2017).

To carry out the descriptive study of the sample, the demographic data from the first part of the questionnaire were examined using cross-tabulation tables, with the aim of understanding the participants' experience and the industrial sector to which they belong. For the items contained in the second and third sections of the data collection instrument, the median was used as a measure of central tendency because the ratings are on an ordinal scale, while the interquartile range, which is determined by subtracting the third quartile from the first quartile, was used as a measure of dispersion (García-Alcaraz *et al.*, 2017).

The variables in Figure 1 were validated before being integrated into the proposed model, and several indices were used, such as (Kock, 2015).

- For internal validation, Cronbach's alpha (CA) and reliability indices were used, both with values greater than 0.7.
- For parametric predictive validity, the R2 and adjusted R2 indices were used, and

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values greater than 0.02 were sought. For non-parametric predictive validity, Q2 was used, and values similar to R2 were sought.

- For convergent validity, the extracted mean variance (EMV) was used with a value greater than 0.5.
- For collinearity, the variance inflation factor (VIF) was used with values lower than 3.3.

In this phase, a structural equation model (SEM) was used to validate each of the hypotheses and measure the relationship between TSL and TFL and the three types of performance analyzed. The analysis used WarpPLS v. 8® software, based on partial least squares (PLS), which is recommended for small samples with non-normal distribution or information obtained on the Likert scale (Kock, 2019). All hypotheses were verified with a reliability level of 95% (significance of 5%).

Prior to interpreting the model, the following measures of model efficiency were established (Kock, 2019):

- The mean trajectory coefficient (MTC) measures the relationship between variables.
- For the predictive validity of the model, the R^2 and adjusted R^2 indices were used, and the aim was for them to exceed a value of 0.2.
- The inflation index of the mean variance of the block (IIVMB) and of complete mean collinearity (IIVMC) were used to measure collinearity between constructs and values below 3.3.
- Tenenhaus GoF was used to measure the fit of the data to the model, with a value greater than 0.36. .

In this study, direct effects (no indirect effects) were analyzed to validate the hypotheses, which are visualized as arrows connecting the latent variables in Figure 1, and a standardized β value is estimated using MCP. The null hypothesis H0: β=0 is tested against the alternative hypothesis H1: β≠0. With a confidence level of 95%, it is statistically evident that β=0, so there is no relationship between the latent variables, and the hypothesis is rejected; on the other hand, if it is evident that β≠0, regardless of the sign, then there is a relationship between the variables, and the hypothesis is accepted.

In addition, for each dependent construct, an R2value is estimated as a measure of the variance explained by the independent constructs. Furthermore, for each projected effect, an effect size (TE) is indicated, which establishes the amount of variance explained by an independent construct in a dependent construct. The sum of TE in an independent variable is equal to R2of that variable.

In addition to the above, for each hypothesis in Figure 1, a sensitivity analysis is reported, where three types of probabilities of occurrence of the constructs at high levels P(Zi>1) and low levels P(Zi<-1) are estimated, where Zi is a standardized variable. The three probabilities calculated are the probability of finding the constructs at high or low levels in isolation, the probability of finding independent and dependent constructs in combination at high and low levels, which are established by & y, and the conditional probability that a dependent construct will occur at a high or low level, given that the independent construct has occurred, which is represented by "IF".

Results and discussions

A total of 178 questionnaires were obtained at the end of the period; however, 22 were eliminated for not meeting the inclusion requirements, leaving a total of 156 valid questionnaires for analysis, of which 41.7% were answered by men and 58.3% by women. Table 1 shows the participants' positions in the survey and the number of years they have been in their positions. It can be noted that engineers and managers gave a response of 76 and 56, respectively. In addition, most of the survey participants had between 2 and 5 years of experience in their position (70.51%), which indicates that the data is reliable.

Table 1

Position and years of experience

Position	Years of experience			Total
	2 to 5	5 to 10	>10	
Director	41	9	6	56
Engineer	52	14	10	76
Supervisor	17	4	3	24
Total	**110**	**27**	**19**	**156**

Note. This table shows the relationship between position and years of experience among respondents.

Table 2 shows the number of employees in the companies and the industrial sector to which they belong. Most of the participants are from large corporations, given that 101 of these have more than 500 workers (64.74%), and the most prominent industrial sectors were automotive and services, with 47 and 46 surveys, respectively, corresponding to 59.61% of the total.

Table 2

Industrial sector and number of employees in the company

Number of employees	Industrial sector								Total
	A	L	P	M	E	M	C	S	
0-50	5	3	0	0	0	2	0	12	22
51-100	2	0	0	0	1	0	0	4	7
101-200	3	4	0	1	0	1	0	3	12
201-500	1	3	2	3	0	0	0	5	14
501 or more	36	16	4	2	1	15	5	22	101
Total	**47**	**26**	**6**	**6**	**2**	**18**	**5**	**46**	**156**

Nota. The table shows the relationship between the number of employees and the industrial sector to which the company where the respondents work belongs. The header shows the letters for each sector. Where: A- Automotive, L- Electricity, P-Plastics, S- Services, M- Metals, E- Packaging, M- Medicine, C- Communications.

Table 3 presents the descriptive analysis of the observed variables in the model. It should be noted that the items eliminated during the CA cleansing process are not indicated.

Table 3

Median and interquartile range of the observed variables in the model

Transactional leadership	Median	RI
Reward systems	2.9222	1,79
Fulfillment of obligations	4.0833	1.6855
Personal recognition	3.233	1.6102
Focus on organizational goals	4.3412	1.4203
Follow-up control	3.9555	1.6015

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Improving development opportunities	3.68	1.6711
Short-term strategies	3.7551	1.6506
Transformational leadership	**Median**	**RI**
Values	4.0636	1.6127
Confidence	4.0625	1.5489
Self-reward	3.4464	1.5933
Satisfaction	3.5892	1.552
Modeling organizational behavior	3.6194	1.5132
Organizational commitment	3.6442	1.6306
Long-term strategies	3.7227	1.6119
Flexibility / Adaptability	3.6813	1.8005
Effectiveness	3.75	1.5853
Social performance	**Median**	**RI**
Implementation of staff motivation campaigns	3.0352	1.7929
Internal staff development / promotion rate	3.5463	1.8
Promote employee commitment to belonging	3.4418	2.0046
Attracting talent	3.2597	2.0988
Operational performance	**Median**	**RI**
Pre-sales service	3.7428	1.5151
After-sales service	3.7641	1.4947
Equipment utilization level / OEE	4.0176	1.4979
Sufficient installed capacity	3.9494	1.5036
The company focuses on innovation	3.8333	1.5339
Environmental performance	**Median**	**RI**
The company sets annual environmental targets.	4.2833	1.54
The company has environmental indicators displayed on the premises.	4.2905	1.6272

Note. This table shows the median and interquartile range of the observed latent variables.

The validation indices of the latent variables are shown in Table 4, and according to these values, the variables are valid and can be integrated into the SEM, as they all comply. It can therefore be concluded that there is sufficient internal, convergent, and predictive validity, and that the collinearity is acceptable (see the "better if" column to compare the value). In addition, the Jarque-Bera (JB) normality test is reported, which indicates that the variables are not normal and justifies the use of the partial least squares approach.

Table 4

Construct validation

Index	TSL	TFL	DO	DA	DS	Better if
R-squared			0.465	0.459	0.626	≥0.2
Adjusted R-squared			0.458	0.452	0.621	≥0.2

Index	TSL	TFL	DO	DA	DS	Better if
Composite reliability	0.9	0.934	0.921	0.96	0.947	≥0.7
Cronbach's alpha	0.779	0.906	0.886	0.918	0.925	≥0.7
Mean variance extracted	0.819	0.78	0.745	0.924	0.816	≥0.5
Total collinearity VIF	2.173	3.6	1.957	1.931	2.711	≤3.3
Q-squared			0.469	0.461	0.627	≤3.3
JB normality test	No	No	No	No	No	

Note. This table shows the validation indices for leadership and the three performances proposed in the hypotheses.

The model efficiency indices are presented in Table 5, and it can be seen that the CMT, RCM, and RCMA indicate acceptable predictive validity, while the IIVMB and IIVMC values indicate the absence of collinearity and the Tenenhaus index indicates a correct fit of the data. The model evaluated in the WarpPLS v.7 program is shown in Figure 2, which presents the normalized β values and the p-value linked to the hypothesis. In addition, the R-squared value corresponding to each dependent variable is specified.

Table 5

Model efficiency indices

Index	Value	Better if
Average trajectory coefficient (CMT)	0.381, P<0.001	p<0.05
Mean R-squared (MRS)	0.517, P<0.001	p<0.05
Adjusted mean R-squared (AMRS)	0.510, P<0.001	p<0.05
BBMean block-wise VIF (IIVMB)	1.966	<3.3
Mean total collinearity VIF (IIVMC)	2.474	<3.3
Tenenhaus GoF (GoF)	0.650	>0.36

Note. This table shows the model's efficiency indices. The first column shows the index, the second column shows the value obtained, and the third column shows the validity indicator.

Figure 2

Model evaluated

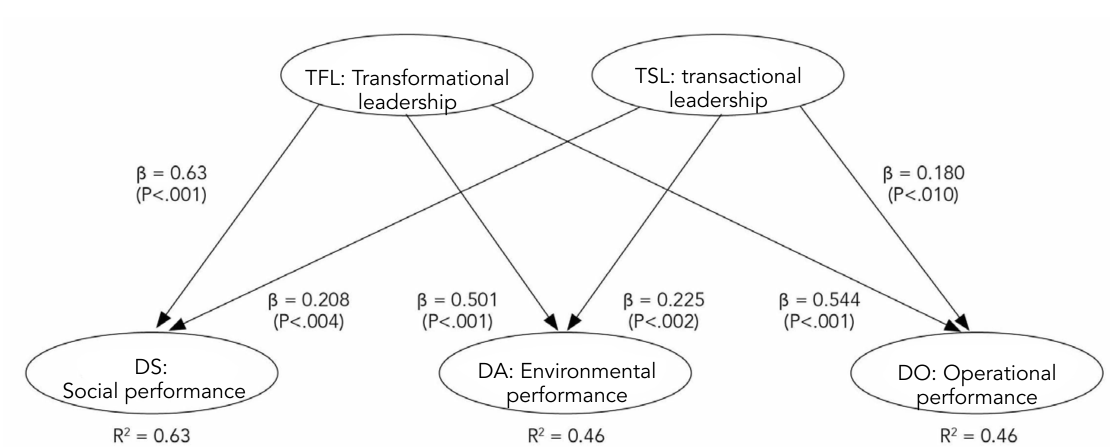

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Table 6 shows the conclusions relating to all the hypotheses, according to the values in Figure 2 of the evaluated model. The β value symbolizes the relationship between the latent variables and is linked to the p-value to evaluate the statistical relevance of the relationships. An illustrative case is the correlation between TFL and DS, which has a relationship of $\beta=0.630$ and $p<0.001$, showing that if the TFL increases its normal deviation by one unit, the DS increases by 0.630.

Table 6

Summary of conclusions on the hypotheses

Hypothesis	Relationship	β	P-value	Decision
H_1	TSL→DS	0.208	=0.004	Not rejected
H_2	TFL→DS	0.630	<0.001	Not rejected
H_3	TSL→DA	0.225	=0.002	Not rejected
H_4	TFL→DA	0.501	<0.001	Not rejected
H_5	TSL→DO	0.180	=0.010	Not rejected
H_6	TFL→DO	0.544	<0.001	Not rejected

Note. *Prepared by the authors using data from WarpPLS.*

In general terms, it can be observed that TFL has greater effects on DS, DA, and DO compared to TSL, as the β values are higher. For example, the effect of TFL on DS is 0.630, while that of TSL is only 0.208, three times lower. In the model presented in Figure 1, six hypotheses were proposed and, based on the results obtained and presented in Figure 2, it can be deduced that:

H_1 **.** There is sufficient statistical evidence to support the claim that TSL has a direct and positive impact on DS in the Mexican manufacturing industry, given that the former construct increases its standard deviation by one unit, while the latter construct increases it by 0.208 units. This finding implies that this leader focuses on offering a reward system, recognizing staff, improving growth opportunities for employees by increasing motivational campaigns and the internal promotion rate, and increasing worker satisfaction and commitment to belonging. This work contradicts the study conducted in Malaysia, in which no significant relationship was found (Saeidi *et al.*, 2021), which may be due to the specific environment of the Mexican maquiladora industry.

H_2 . There is sufficient statistical evidence to support the claim that TFL has a direct and positive impact on DS in the Mexican manufacturing industry, since TFL increases the standard deviation by one unit, DS also increases by 0.630 units. This finding implies that leaders who possess ethics, values, and adaptability will increase the attraction and development of internal talent and promote loyalty to the company, which will help create a good working environment and stability. This study coincides with research conducted in Malaysia, which showed that TFL offers a better result for DS compared to TSL (Saeidi *et al.*, 2021).

H_3 . There is sufficient statistical evidence to support that TSL has a direct and positive impact on DE in the Mexican manufacturing industry, because when TSL increases the standard deviation by one unit, DE increases by 0.225 units. These findings imply that this leader is oriented toward compliance with obligations and focuses on organizational goals, which will impact compliance with the environmental indicators disseminated in the company and supports legal compliance with environmental requirements. This study coincides with the one conducted in the United Arab Emirates, where a significant relationship between TSL and DS was also found (AlNuaimi *et al.*, 2021).

H_4 . There is sufficient statistical evidence to support the claim that TFL directly and positively influences DE in the Mexican manufacturing industry, as TFL increases the standard deviation by one unit, DE increases by 0.501 units. This means that this leader focuses on modeling organizational behavior and implementing long-term strategies, which will help establish annual environmental goals and promote the company's green image. A study conducted in China showed that there is a positive relationship between TSL and DE (Chen *et al.*, 2021), which coincides with this research. However, the study conducted in the United Arab Emirates revealed that TSL does not directly influence green hiring, but it does so through the mediating variable of innovation capacity; i.e., the effect is not direct (AlNuaimi *et al.*, 2021), which differs from the results obtained. This may be due to regional issues.

H_5 . There is sufficient statistical evidence to support the claim that TSL has a direct and positive impact on DO in the maquiladora industry, because if TSL increases the standard deviation by one unit, DO increases by 0.180 units. This finding implies that this leader establishes control over followers, short- and medium-term strategies, and focuses on organizational goals, which will help utilize equipment and installed capacity, impacting customer service. A study conducted in China showed that TSL significantly affected DO (Chen *et al.*, 2021), which coincides with the results shown in this research.

H_6 . There is sufficient statistical evidence to support the claim that TFL has a direct and positive impact on DO in the Mexican manufacturing industry, because when TFL increases the deviation by one unit, DO increases by 0.541 units. This finding implies that leaders with effectiveness, flexibility, and self-reward will help improve innovation in the company and the level of pre- and post-sales service, as well as improve customer loyalty. The study conducted in China found that TFL had a significant effect on DO (Chen *et al.*, 2021), which coincides with this research.

The sensitivity analysis in Table 7 shows the probabilities of each variable in the four possible scenarios when they occur in isolation in their high (+) and low (-) scenarios, jointly (&) or conditionally (IF). For example, the probability of TFL+ and DS+ is 0.567; if TFL occurs only at its high level, it is 0.141, and at its low level, it is 0.173; SD is 0.192 at its high level and 0.186 at its low level; and jointly, these two variables are 0.109 at their high level.

Table 7

Sensitivity analysis

Latent variables			TSL		TFL	
Level			+	-	+	-
DO	+	0.160	&=0.064	&=0.013	&=0.083	&=0.006
			SI=0.400	SI=0.080	SI=0.520	SI=0.040
	-	0.147	&=0.013	&=0.083	&=0.006	&=0.090
			SI=0.087	SI=0.565	SI=0.043	SI=0.609
DS	+	0.192	&=0.083	&=0.006	&=0.109	&=0.000
			SI=0.433	SI=0.033	SI=0.567	SI=0.000
	-	0.186	&=0.000	&=0.115	&=0.000	&=0.128
			SI=0.000	SI=0.621	SI=0.000	SI=0.690
DA	+	0.000	&=0.000	&=0.000	&=0.000	&=0.000
			SI=0.537	SI=0.397	SI=0.635	SI=0.623
	-	0.224	&=0.006	&=0.122	&=0.000	&=0.128
			SI=0.029	SI=0.543	SI=0.000	SI=0.571

Note. The table shows a sensitivity analysis of dependent and independent constructs at their high and low values.

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TFL+ shows higher probabilities of generating positive performance in the three dimensions analyzed (social, operational, and environmental). In particular, the conditional probability of a DS+ under a TFL+ (IF(DS+ | TSFL+)) is 56.7%, reflecting that this style can inspire employees to align with important social goals. Likewise, DO+ (IF(DO+ | TSFL+) =52.0%) and DA+ (IF(DA+ | TSFL+) =63.5%) are also positively influenced. This indicates that TFL fosters a work environment in which workers feel valued and motivated to give their best, promotes creativity and the search for innovative solutions, a key factor in improving operational processes and adapting to dynamic environments.

For its part, TSL+ has a lower impact on the occurrence of high-performance levels compared to TFL+. For example, for DS+ to occur within the framework of TSL+, there is only a 43.3% chance, while DO+ is 40% and DE+ is 53.7%; however, even so, they can still occur.

Nevertheless, it is important to mention that a balanced leadership style is required. Although TFL has a stronger positive impact overall, transactional leadership (TSL+) can also contribute to positive results if combined appropriately. For example, the conditional probability of a DO+ under TSL+ is 40.0%, indicating that this style can be useful for maintaining stability and efficiency in certain areas. In other words, TSL provides the structure necessary for efficient operations, while TFL inspires innovation and commitment, so managers must adapt to their own organizational needs.

It is observed that low levels of leadership in any style are a strong organizational risk. For example, the presence of TSL can generate a DS in 62.1%, a DO in 56.35%, and a DE in 54.3%, reflecting that an absence of structure, clear reinforcement, or effective communication can lead to a deterioration in organizational cohesion and effectiveness. In addition, the occurrence of TFL is also an organizational risk, as it can generate a DS in 69%, a DO in 60.9%, and a DE in 57.1%. In other words, low levels of any type of leadership represent organizational risks.

These low levels of leadership and performance may be due to a lack of clear objectives, in which there is no clear guidance for employees, thereby creating confusion and decreasing productivity, as well as a lack of adequate structure to manage expectations that generate tension and demotivate work teams.

Finally, it is important to mention that due to the increased environmental awareness of customers and the general public, TFL+ offers better results that allow organizations to comply with government regulations and standards, providing a green and socially responsible image that differentiates them from their competitors and gives them a competitive advantage.

Conclusions

The results obtained show that both TSL and TFL have a direct and positive impact on social, operational, and environmental performance; however, the impact of TFL was always greater in the three types of performance analyzed. The main contribution of this study is the demonstration that TFL has more than twice the impact of TSL on organizational performance (DS, DE, DO), which sets the standard for companies to develop this type of leadership among administrative staff and thereby obtain greater benefits in their organizational culture, productive and environmental operations. It should be noted that both types of leadership had a positive impact and that the application of each should be analyzed, considering the context of the company and the desired results. Applying TSL is very useful in supervisory and coordination positions, or in structured jobs that allow employees to understand their roles, the actions they must take, and the scope of the goals they must meet. It is also recommended when the company needs to make rapid changes, increase agility in its operations, and adapt quickly to market changes. However, TFL focuses on achieving better long-term market positioning, so it may work better in senior management positions in companies where long-term corporate strategies are developed.

On the other hand, it should be noted that the data comes from a sample obtained in the manufacturing industry in Ciudad Juárez (Mexico), which has specific cultural, social, and governmental characteristics due to its location on the border with the United States of America and refers only to maquiladora companies, so the results reported here may differ from other regions. Furthermore, it is based on only 156 responses, which represents a limitation. Future research may focus on replicating the study in other regions of the country or other countries, and/or in different industrial sectors, as well as including financial performance as a response variable.

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