

## IMPACT OF TRANSFORMATIONAL LEADERSHIP AND TECHNOLOGICAL INNOVATION ON SUSTAINABLE PERFORMANCE OF MSMEs IN GUANAJUATO

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**Abstract:** Today's companies have been immersed in new paradigms that demand fully sustainable results; few companies have been at the forefront of micro-environmental issues and have demonstrated that everything depends on comprehensive leadership. The objective of this research is to analyze the impact of transformational leadership and technological innovation on the sustainable performance of micro, small and medium-sized enterprises (MSMEs) in Valle de Santiago, Guanajuato, Mexico, and its surroundings. The design focuses on a quantitative, explanatory, and correlational method, with a representative sample of 100 participating companies in the state of Guanajuato. The research used a survey with 114 Likert-type questions based on three respective covariates: sustainable performance, transformational leadership, and technological innovation. In this sense, the results revealed that transformational leadership had a positive influence in 63.7% of cases, which had a significant impact on the sustainable performance of MSMEs. However, technological innovation had a minimal positive correlation of 54.0%, which means that companies still need to employ innovation strategies. This research is relevant because it shows that there is little theoretical evidence on the subject, especially in technological innovation; however, good transformational leadership has a positive effect on organizations seeking change for the good of all involved and to increase environmental sustainability.

**Keywords:** sustainable performance, technological innovation, transformational leadership


**JEL Classification:** M, M1, O3, O32

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## Introduction

Today, organizations are looking for better sustainable alternatives that promote strategies with respect to the business environment (Miranda-Torrez, 2021). With this approach, it is necessary to have leaders who contribute to an interest in their workers and the organization, to improve intellectual capabilities and generate value (Sánchez et al., 2021). In the modernized industry, significant competitive changes have been made through a globalized approach, capable of transforming authoritarian mindsets into more open ones in accordance with organizational needs. In this way, leadership becomes a force that inspires the development of more sustainable models aimed at the same objective (Cárdenas Contreras et al., 2023).

Transformational leadership empowers human capital to be generators of more changeable sustainable environments and disciplines workers to foster unique and unmistakable advantages (Carrillo et al., 2023). According to Muralidharan and Pathak (2018), their findings indicate that transformational leadership theory is supported by sustainable cultures, conditions, and environments for society, which positively influence organizations.

Sustainable performance leads to protecting, conserving and protecting resources toward a society that involves awareness, responsibility, sensitivity towards nature; as well as ecological, economic, social, and cultural policies; to improve people's lifestyle by developing strategies for the common good (Santacruz et al., 2020). Taking into account the above, the aim is to increase profitability, productivity, and sustainability in MSMEs through business performance directed at workers (Secretaría de Competitividad, 2018). This is achieved by supporting companies in implementing changes (Clancy & Román, 2013).

The relationship between transformational leadership and sustainable performance is of interest to micro, small and medium enterprises (MSMEs), especially in terms of how leadership intervenes to create knowledge, creativity, and innovation and become more productive (Varela Medina & Marín Balcázar, 2021).

The aim of this paper is to analyze the impact of transformational leadership and technological innovation and sustainable performance on micro, small and medium enterprises (MSMEs) in and around Valle de Santiago, Guanajuato, Mexico. The following sections are proposed for this paper: first, the introduction framework is presented, highlighting the problems identified; the second section presents the literature framework, discussing the theories found according to the recommended authors; the subsequent section reports the general results of the study using inferential statistics; and finally, the conclusions and discussion are presented.

## Literature review

### Transformational leadership

Avolio and Bass (2000) state that transformational leadership commits workers to follow the same objective, to focus collectively, forgetting individuality, and becoming aware that they are capable of facing commitments to the organization.

Leithwood and Jantzi (2000) note that for transformational leadership to be effective, mutual support is necessary, oriented toward the organization, where motivation, ethics, harmony, and well-being contribute to greater productivity.

According to González and González (2008), transformational leadership is defined as a process that interacts with various members of a group, in which the leader acts as a facilitator who motivates change. For Bass et al. (2003), they claim that transformational leadership focuses on raising awareness of employees to become followers who are committed to the organization. Leaders under transformational leadership foster trust among their employees, encourage them to take risks, and have a vision to achieve the organization's goals (Pertuz, 2018).

In this sense, Pando et al. (2022) point out that in transformational leadership, it is necessary to encourage employees to participate in the work with impetus, emotion, enthusiasm, and the necessary confidence to achieve the objectives. To understand the leadership theories of the 20th century, three types of leadership are considered: transactional, *laissez-faire* and transformational; the latter is the most popular due to the characteristics such as effectiveness, discretion, knowledge, communication, creativity, and innovation (Fauzi et al., 2021; Teymournejad & Elghaei, 2017). Reference is made to the theory proposed by Bass (1987), which states that the leadership model presents the traits of a transformational leader who attends to the needs of the group, makes greater efforts for people, and fulfills shared objectives and goals (Minaya, 2021).

From this arises the first hypothesis, which is stated as follows:

H1: Transformational leadership has a significant positive effect on sustainable performance.

### **Technological innovation**

The issue of innovation is crucial for companies that want to be productive and competitive, as values and challenges shape sustainable development. This has been demonstrated by companies that have invested in innovation and achieving inclusive, sustainable and resilient societies (Schwab & Zahidi, 2020). It is relevant to mention that there is a consensus in innovation studies regarding transformational leadership as an integral collaborator (Bass et al., 2003), in which leaders introduce new ideas to the organization with the aim of meeting specific goals and objectives while also encouraging the creation of innovative initiatives (Harborne, 2003). In some organizations, innovation can be seen as a shared responsibility, bringing with it economic and social costs, leading to changes in order to avoid going bankrupt (Garzón & Ibarra, 2013).

Technological innovation comes from innovation, which is an important factor in being able to create competitive advantages and sustainable benefits for the organization. A technologically capable company can outperform any other company by improving its efficiency and will be able to perform better (Bowonder et al., 2010). Therefore, the following hypothesis is proposed:

H2: Innovation is positively related to sustainable performance.

## **Sustainable performance**

On the other hand, the theory of performance proposed by Campbell et al. (1990) covers three basic behaviors that refer to know-how according to knowledge, personal skills, and motivation that is related to the behaviours of individuals. In addition to the above, in order to respond to these behaviors, it is necessary to envision a future that is environmentally friendly. Sustainable development serves as a tool to combat harmful practices, focusing on creating greater value for environmental companies and fostering awareness to produce innovative and eco-friendly products (Severo & De Guimarães, 2022). Today's entrepreneurs must encourage the partnership among their members towards sustainable development, contributing to better practices with innovative results that help a better sustainable environment, and establishing common goals that help to foster excellent living conditions (Ki-Mon, 2014).

## **Some case studies**

In Mexico, a non-experimental, cross-sectional study was conducted with a maquiladora company in the automotive industry on the northern border of Mexico. Transformational leadership had a positive effect on the company's operational performance with a sample of 300 middle managers (Vargas-Salgado & Gómez-Bull, 2021). In another study with a sample of 100 managers of an entertainment company in Mexico City, transformational leadership in managers was found to influence the performance of their staff with behavioral subscales (stimulation, idealized influence, and individual consideration), which was measured with structural models (Mendoza et al., 2014).

In a study conducted in the province of Huaura, Peru, employees participated in a transformational leadership program, committing themselves to sustainable changes through new values, improved policies, innovation and risk-taking in line with their organizational culture (Coronado et al., 2023). Another very particular case was in a health care institution in Peru, where a study was conducted that revealed important data on the relationship between transformational leadership and organizational health and well-being; These were positive when implementing leadership skills among employees (Perilla-Toro & Gómez-Ortiz, 2017).

In the case of Colombia, research was carried out with 210 companies, where it was found that the relationship between transformational leadership and organizational performance had a positive impact on their sustainability (Morales García et al., 2023). However, in other cases, such as the hotel sector, transformational leadership has been found to have an impact on the work of employees as personal burn-out (Kloutsiniotis et al., 2022), as well as on the health sector (Chen et al., 2022). In the case of Germany, a meta-analysis was conducted with 58 cases, where personality traits and their performance with the leader were measured, showing important data where the traits are indirectly and differentially related to the subdimensions of transformational leadership (Deinert et al., 2015).

Finally, in a savings and credit cooperative in the province of Bolivar, Ecuador, a study was conducted with 99 workers to assess employee performance. The results showed low performance due to a lack of motivation, inadequate work environment, rigid schedules, product-related processes, poor physical conditions, and limited opportunities. These factors indicated that the company demonstrated little leadership towards its members (Durán et al., 2024). In such cases, transformational leadership is observed to be inherent in every organization, particularly through certain traits of the leader that encourage collaborators to assume joint responsibility. This is reflected in the new ideas promoted by the workers themselves, allowing ideas to flow and generate change, while fostering technological innovation as a fundamental tool for sustainable products or services. Ultimately, this leads to greater business performance.

## Methodology

The purpose of the paper is to analyze the impact of transformational leadership and technological innovation on the sustainable performance of micro, small, and medium enterprises (MSMEs) in Valle de Santiago, Guanajuato, Mexico, and its surroundings. Therefore, in this research, we used the quantitative method with a descriptive and correlational approach through multiple linear regression analysis. The sample consisted of 100 MSMEs managers in Valle de Santiago, Guanajuato, Mexico, and its surroundings, representing different sectors such as the automotive industry, services, and commerce. Most companies are owned by natural persons whose minimum level of education is high school or a bachelor's degree. In relation to the literature, it is highlighted that in the model of Avolio and Bass (2000), workers should focus only on collective decisions and follow the same objective. These previous studies were taken into account to obtain the findings in relation to the constructs presented and their respective scales.

The instrument consisted of 114 items, with Likert-type questions from which only some of the categories of the five blocks were chosen, such as innovation, sustainable performance, sustainable marketing, business performance, and transformational leadership. Having said this, the correlations of the variables studied were analyzed and validated with the Cronbach alpha tool (Cronbach, 1951) with a value of 0.982 (see Table 1). The software used was SPSS V.25.

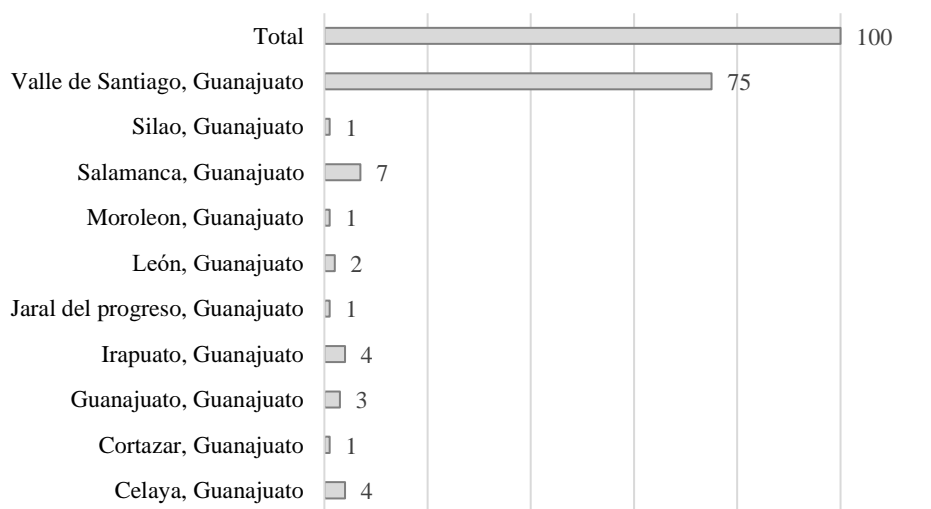
**Table 1. Reliability statistics**

	Cronbach's alpha	Cronbach alpha based on the typed items	N of elements
Variables	0.917	0.982	99

Source: Own elaboration

## Results

Figure 1 shows the main municipalities surrounding the city of Valle de Santiago. Silao, Salamanca, Moreleón, León, Jaral del Progreso, Irapuato, Guanajuato Capital, Cortazar, and Celaya, Guanajuato, Mexico. Among the companies, 73 are individual entrepreneurs and 27 are legal entities. Of these, 54 are commercial, 11 are industrial, and 35 are service-oriented. In terms of gender, 52 are men and the rest are women. Regarding educational levels, 11 have completed high school, 7 have a technical or commercial qualification, 25 have basic education, 39 hold a bachelor’s degree or engineering qualification, and 13 hold a post-graduate degree.



**Figure 1. Municipalities**

Source: Own elaboration

Table 2 shows the descriptive statistics of the mean of the data, which are composed of the constructs. The dependent variable (Sustainable Performance) is observed with a total of 118.170, while the independent variables (Transformational Leadership) and (Innovation) resulted in values of 20.580 and 41.560, respectively.

**Table 2. Descriptive statistics**

Variables	Media	N
Sustainable Performance	118.170	100
Transformational Leadership	20.580	100
Technological Innovation	41.560	100

Source: Own elaboration

In relation to the Pearson correlations, it is highlighted that the data are within values less than 1, where the independent variable Transformational Leadership shows a value of 0.637 and the innovation variable was 0.540, these parameters are strongly correlated with the dependent variable Sustainable Performance and are significant positive with values of 0.000 in both cases (see Table 3).

**Table 3. Correlations**

		<b>Sustainable P.</b>	<b>Transformational L.</b>	<b>Technological I.</b>
Pearson correlation	Sustainable P.	1.000	0.637	0.540
	Transformational L.	0.637	1.000	0.352
	Technological I.	0.540	0.352	1.000
Sig. (unilateral)	Sustainable P.		0.000	0.000
	Transformational L.	0.000		0.000
	Technological I.	0.000	0.000	

Source: Own elaboration

Table 4 presents the summary of the model obtained in successive steps. The results indicate that the most important variable appears in Model 2, where the R value reached 0.721, corresponding to a reliability of 72.1%.

**Table 4. Summary of the model**

<b>Model</b>	<b>R</b>	<b>R square</b>	<b>R-squared corrected</b>	<b>Standard error of estimation</b>	<b>Durbin-Watson</b>
1	0.637a	0.406	0.400	15.095	
2	0.721b	0.520	0.510	13.639	2.285
a. Predictor variables: (Constant), Transformational L.					
b. Predictor variables: (Constant), Transformational L., Technological I.					
c. Dependent variable: Sustainable P.					

Source: Own elaboration

For ANOVA in Model 2, the F value was 52.560 and a significance of 0.000, which is statistically significant (see Table 5).

**Table 5. ANOVA**

<b>Model</b>		<b>Sum of squares</b>	<b>gl</b>	<b>Root mean square</b>	<b>F</b>	<b>Sig.</b>
2	Regression	19556.356	2	9778.178	52.560	0.000c
	Residual	18045.754	97	186.039		
	Total	37602.110	99			

Source: Own elaboration

For the testing of the hypotheses, the coefficients typified by the Beta values of Model 2 were used. As can be seen in Table 5, the transformational leadership variable had a result of 0.510, which represents 51.0%; therefore, the alternative hypothesis is accepted. The significance level was .000, which is considered significant according to the criterion of  $p < 0.001$  at 99% reliability. The variable of technological innovation obtained a result of 0.361, equivalent to 36.1%. This indicates that the second alternative hypothesis is also accepted, although it had a lower but still positive value (see Table 6).

**Table 6. Coefficients<sup>a</sup>**

Model	Unstandardised coefficients		Typified coefficients	t	Sig.	95.0% confidence interval for B		Collinearity statistic		
	B	Error tip.	Beta			Lower limit	Upper limit	Tolerance	FIV	
2	C	37.034	8.147		4.546	0.000	20.865	53.204		
	T.L.	2.239	0.330	0.510	6.792	0.000	1.584	2.893	0.876	1.141
	T.I.	0.844	0.176	0.361	4.799	0.000	0.495	1.193	0.876	1.141

C = (Constant)

T.L. = Transformational L.

T.I. = Technological I.

a. Dependent variable: Sustainable P.

Source: Own elaboration

Finally, to verify the mathematical equation of the linear regression, based on the descriptive data provided, the following model was obtained:

$$Y = \beta_0 + \beta_1(\text{Transformational Leadership}) + \beta_2(\text{Technological Innovation})$$

$$Y = 37.034 + 20.580(2.239) + 41.560(0.844)$$

$$Y = 118.17$$

## Discussion and conclusion

The objective of this research was corroborated by the proposed hypotheses. These were accepted in their entirety with the inferential statistic of multiple linear regression, which yielded positive information with a reliability of 72.1%. In terms

of descriptive data, most of the companies belong to the municipality of Valle de Santiago, Guanajuato, Mexico. Most of these companies are sole proprietorships, which means that they are owned by a single owner, the predominant gender is male, and their level of education is a bachelor's degree and engineering. In this sense, the results show that sustainable performance is closely related to transformational leadership, with a value greater than 63.7%. The study was corroborated by Bass et al. (2003), who found that the greater the interaction between employees and their leaders, the greater their commitment to the organization. Similarly, it agrees with Leithwood and Jantzi (2000), who state that mutual support between workers and managers makes the organization more productive. This means that business leaders are increasingly committed to participating favorably in the achievement of fully sustainable environments. In terms of technological innovation, it obtained a positive result, although less than 54%, which was confirmed by the theory proposed by Bowonder et al. (2010), who state that a company breaks down barriers by improving its efficiency to achieve greater organizational performance. Consequently, in the study proposed by Schwab and Zahidi (2020), innovation goes hand in hand with sustainable development, as it shows that companies that invest become more competitive and profitable. As observed in this study, transformational leadership was identified as a key factor in companies seeking sustainable solutions, since it measures the opinions, experiences and proposals of employees towards the same common and shared goal. It was also observed that there is effective and organized motivation with elements that have had a positive impact on a culture of technological innovation. Therefore, the study provides a basis for future research on the transformation of leaders who share common values and a unified vision. On the other hand, technological innovation also played an important role, as most entrepreneurs use a level of innovation in their production processes. Similarly, innovation should be considered a beneficial component designed for sustainability.

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**Authors' Contribution:** Lidia Ramírez Lemus worked on the theoretical framework, methodology and results (50%). Ma. Leticia Almanza Serrano wrote the introduction and part of the theoretical framework with 30% and Alejandro Ramírez Barajas designed the instrument, conclusions and discussion with 20%.

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**AI Declaration:** No AI tools were used.

## WPŁYW PRZYWÓDZTWA TRANSFORMACYJNEGO I INNOWACJI TECHNOLOGICZNYCH NA ZRÓWNOWAŻONE WYNIKI MŚP W GUANAJUATO

**Streszczenie:** Współczesne przedsiębiorstwa funkcjonują w nowych paradygmatach, które wymagają w pełni zrównoważonych rezultatów. Niewiele firm znalazło się na czołowej pozycji w kwestiach mikrośrodowiskowych i wykazało, że wszystko zależy od kompleksowego przywództwa. Celem niniejszych badań jest analiza wpływu przywództwa transformacyjnego oraz innowacji technologicznych na zrównoważone wyniki mikro-, małych i średnich przedsiębiorstw (MŚP) w Valle de Santiago, Guanajuato (Meksyk) i jego okolicach. Projekt badawczy opiera się na metodzie ilościowej, wyjaśniającej i korelacyjnej, z reprezentatywną próbą 100 firm uczestniczących z terenu stanu Guanajuato. W badaniu wykorzystano ankietę składającą się ze 114 pytań zgodnie z metodologią skali Likerta, opartą na trzech zmiennych: zrównoważone wyniki, przywództwo transformacyjne i innowacje technologiczne. W tym kontekście wyniki wykazały, że przywództwo transformacyjne miało pozytywny wpływ w 63,7% przypadków, co istotnie wpłynęło na zrównoważony rozwój MŚP. Z kolei innowacje technologiczne wykazały minimalną pozytywną korelację na poziomie 54,0%, co oznacza, że firmy nadal muszą wdrażać strategie innowacyjne. Niniejsze badanie jest istotne, ponieważ wskazuje na niewielką ilość istniejących dowodów teoretycznych w tym zakresie, zwłaszcza w odniesieniu do innowacji technologicznych. Niemniej jednak zauważa się, że dobre przywództwo transformacyjne ma pozytywny wpływ na organizacje dążące do zmian z korzyścią dla wszystkich zaangażowanych stron oraz w celu zwiększenia zrównoważonego rozwoju środowiska.

**Słowa kluczowe:** innowacje technologiczne, przywództwo transformacyjne, zrównoważone wyniki

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