AUTORES

Gerardo Leija González

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Exploring the Influence of Employee Brain Predominance on the Perception of Leadership and Managerial Skills in the Mexican Labor Context

Gerardo Leija González[1]

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Abstract

This study examines how employees' brain dominance influences their perception of their superiors' leadership and their evaluation of managerial skills. We also analyze the implications of employees' perceptions and evaluations of managers in the Mexican labor market. A structural equation model was used with a representative sample of employees from different companies. The results show significant correlations between brain dominance, managerial skills and virtuous leadership of managers. In the same vein, specific connections between brain quadrants and leadership virtues were identified. These findings offer valuable theoretical and practical insights to better understand how cognitive preferences influence the perception of leadership and managerial skills. Acknowledging this cognitive diversity can help promote more inclusive, ethical and productive work environments in Mexico, thereby contributing to a more equitable, competitive and dynamic labor market.

Key Words

Brain dominance, Virtuous leadership, Management skills, Leadership perception, Mexican labor market.

Introduction

Within the complex topic of the Mexican labor market, leadership and management skills stand out as key factors that influence not just the individual success of employees, but also the overall performance of organizations, thereby affecting aggregated macroeconomic entities. The effectiveness of leadership and managerial skills within companies can directly influence labor productivity and, consequently, the country's economic growth. (Cabana, Rivera, Véliz and Aguilera, 2023).

Prior research has shown that effective leadership can significantly enhance efficiency and foster innovation within companies, which can positively affect a country's economic growth, as evidenced by its Gross Domestic Product (GDP). (Bernal, Lucio and Pedraza, 2018). Therefore, understanding and improving leadership and managerial skills in the Mexican labor market has implications not only at the individual and organizational levels but also for the economy as a whole.

[1] Consulting Manager with experience in statistics at RSM and candidate for a Doctor of Administration from La Salle University, Mexico City, gerardo.leija@rsmmx.mx

There is a growing interest in understanding how brain dominance, virtuous leadership, and managerial skills combine to shape business dynamics and the professional development of employees.

In this context, brain dominance refers to the different cognitive tendencies that employees exhibit, influencing how they perceive and respond to work situations. (Herrmann, 1996). These tendencies can determine how employees value and respond to virtuous leadership, which emphasizes ethics, integrity, and justice. Virtuous leadership is closely related to managerial skills, as a leader with high ethical and moral standards can create a fair and motivating work environment where managerial skills such as effective communication, conflict resolution, and strategic decision-making are essential. (Correa, Rodríguez and Pantoja, 2018).

This study is based on the fundamental premise that effective leadership, in conjunction with solid managerial competencies, are essential foundations for the progress and sustainability of organizations in the Mexican labor context; However, this research goes beyond a simple exploration of these aspects in their conventional context; it aims to investigate the interrelation between workers' cognitive profiles, their perception of their direct supervisors' leadership, and the implications this has for business management in Mexico.

A key point involves analyzing the relationship between employees' brain dominance and their perception of leadership at work. Is there a correlation between individual cognitive patterns and a preference for specific leadership styles? This question not only suggests a new approach to human resource management but also highlights the importance of more extensive research on cognitive diversity in the workplace.

Likewise, the importance of virtuous leadership is emphasized as a key factor in fostering ethical and responsible behavior within organizations. This leads to various questions, such as: How is virtuous leadership connected to corporate social responsibility in Mexico? Or, how does it affect the company's culture and the way employees perceive the legitimacy of authority? These inquiries can pave the way for examining the impact of ethical leadership and its contribution to positive change both within and outside Mexican companies. (Correa, Rodríguez and Pantoja, 2018).

The aim of this study is to design a structural equation model to explore the relationship between employees' cerebral dominance, their perceptions of leadership, and the managerial skills of their superiors. This approach is based on the need to examine and encourage research that takes into account how leadership and managerial skills are related to other critical aspects of the Mexican labor market, such as gender diversity in leadership positions, the impact of leadership on youth employment, and the digital transformation of companies.

These topics are not only promising areas of research but also provide opportunities to effect significant changes in business management and labor policy development in Mexico. Therefore, this study aims to deepen the understanding of leadership and managerial skills in the Mexican labor context, and simultaneously, open new perspectives to generate knowledge that guides practices and policies designed to promote a more equitable, ethical, and productive work environment in the country.

Relationship between employees' brain dominance, managerial skills, and leadership perception.

Brain dominance refers to a person's inclination towards the preferential use of one cerebral hemisphere over the other to carry out various cognitive activities. In most individuals, one of the two cerebral hemispheres, either the left or the right, tends to excel in certain mental functions, such as analytical reasoning, creative expression, and language comprehension. (Álvarez, Arauco and Palomino, 2020). This preference can affect environmental perception, response to stimuli, and social interactions.

Brain dominance refers to a model that proposes the division of the brain into four main quadrants, each associated with different cognitive functions and thinking styles. This model posits that the cerebral hemispheres have distinct but complementary functions. The configuration of these quadrants is as follows: 1) Left Limbic: This quadrant is associated with emotions, conservatism, and organization, 2) Left Cortical: Related to logical, analytical, and sequential thinking, as well as mathematical abstraction and quantitative processes; 3) Right Cortical: This quadrant is linked to creative thinking, imagination, holistic vision, and aesthetic appreciation, and 4) Right Limbic: Associated with interpersonal thinking, collaboration, empathy, and sensitivity towards others. (Herrmann, 1996).

These quadrants assist in comprehending and classifying various thinking styles coupled with cognitive preferences. The main idea of this theory is that everyone has access to all these ways of thinking; however, individuals may have preferences or dominances towards certain quadrants over others; these quadrants are what lead to explaining certain behaviors, actions, tastes, or perceptions that we absorb from the real and symbolic world, transforming it into our reality. (Sindeeb, 2018).

Individual cognitive profiles derived from employees' brain dominance lead to an impact on the evaluation of leaders and the response to various leadership approaches. In other words, the thinking patterns along with the information processing of each individual can profoundly shape their perception of the skills and qualities of their superiors, as well as their willingness to follow their leadership directives and strategies (AlHalaseh, 2020).

Various brain dominances could predispose employees to prefer certain leadership styles over others. For instance, there is a hypothesis that individuals with an analytical cerebral dominance may prioritize data-driven and fact-based leadership, while those with an emotional cerebral dominance may lean towards leaders who exhibit empathy and compassion (Hernández et al., 2018). This diversity in leadership preferences may influence employee motivation and commitment, as well as their willingness to embrace their leaders' vision or direction.

In relation to motivation and its impact within the organization, Tomiwa (2021) suggests that employees whose cognitive preferences align with the leadership style of their superiors tend to experience greater intrinsic motivation. Furthermore, it has been observed that the perception of leadership can also be influenced by the managerial skills of the leader. A leader who displays skills in effective communication, instilling confidence, making sound decisions, and fostering teamwork tends to be perceived more favorably by their subordinates. This positive perception of leadership can strengthen employee motivation and commitment, thereby contributing to organizational success.

According to Whetthen and Cameron (2011), there are three main managerial skills: Personal, Group, and Interpersonal; these skills are capable of enhancing the perception of the manager's "good or bad" leadership, as well as legitimizing the leader's authority.

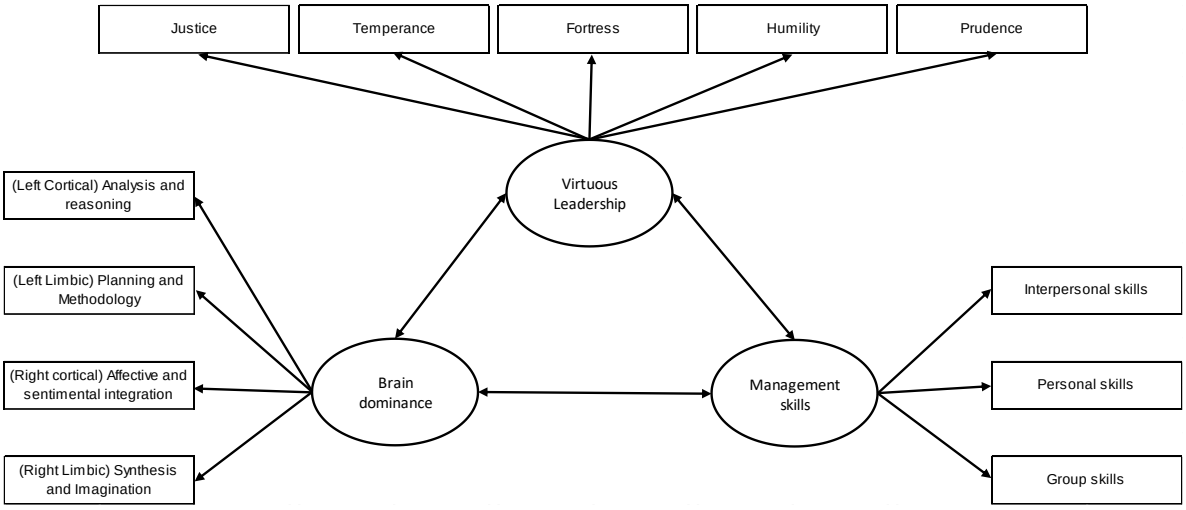
On the other hand, virtuous leadership emerges as a key factor in this dynamic. Leadership based on solid values, ethical principles, and responsible behaviors not only inspires trust and loyalty among team members but also fosters a positive and productive work environment (Baldo, 2018). Virtuous leaders have the ability to make a profound impact on the lives of their followers, motivating them to reach their highest potential and make meaningful contributions to organizational objectives (Demo et al., 2022).

There are virtues identified by Hackett and Wang (2012), Havard (2017) and Crossan, Seijts, Byrne and Reno (2017); that coincide, namely: Justice, Temperance, Fortitude, Humility, and Prudence. These virtues are essential within the organization as they help establish leadership legitimacy and encourage a positive perception of "good" leadership.

The following model proposes a connection between the employee's cerebral dominance, their supervisor's managerial skills, and how they perceive their leadership.

Figure 1

Conceptual model of the interactions between the constructs studied.



Method

A sample of employees from different companies within the Mexican labor market was selected. In this study, a non-probabilistic purposive sampling approach was used, where the units of analysis were chosen based on their availability. (Hernández, 2021; Morales, 2011).

Using the formula for finite populations, with a 95% confidence level and a 5% margin of error, a sample size of 392 participants was determined. This size is considered adequate, as Kline (2011), asserts that a sample of more than 200 units is appropriate for conducting structural equation modeling.

The sample consisted of participants with an average age of 38.84 years and a standard deviation of 6.29 years; 95.44% of the sample falls between 26 and 51 years old. Additionally, 53.10% of the respondents are female and 46.90% are male. The inclusion criterion specified that all respondents should be employees under the supervision of a direct manager.

Measurement Tools

Brain dominance

To operationalize this construct, 4 observable variables were used: 1) Right Cortical (RC), 2) Left Cortical (LC); 3) Right Limbic (RL), and 4) Left Limbic (LL). The combination of these four brain quadrants leads to the creation of the latent variable "Brain Dominance."

The Herrmann inventory (1989), translated into Spanish by Torres and Lajo (2009). was used. This inventory consists of 10 items, each with four response options, each linked to one of the four brain quadrants (LC, RC, RL, and LL). At the end of the evaluation, each response is tallied, and the value is multiplied by 20. Generally, a value above 66 indicates a clear preference, meaning dominance in one of the four brain quadrants of the individual; a value between 33 and 66 indicates intermediate dominance, and values below 33 indicate low dominance. (Álvarez, Arauco and Palomino, 2020).

The inventory demonstrates a Cronbach's Alpha above 0.74, which is acceptable according to the criterion established by Toro et al. (2022). The Cronbach's Alpha coefficient is used to estimate the internal consistency of the instrument and to evaluate the covariation of each item. This allowed for the determination of how well the construct is represented in the items used (Oviedo and Campo, 2005).

Management Skills

Three variables were employed: 1) Personal skills consisting of 7 items; 2) Interpersonal skills comprising 6 items; and 3) Group skills composed of 6 items. The scores for each question are averaged to form the variable mentioned above; hence, it is deduced that a score below 1.5 is classified as low proficiency, a score between 1.5 and 3 indicates medium proficiency, and a score exceeding 3 is deemed high proficiency in the skill. (Whetten and Cameron, 2011).

Several authors have used the "management skills" inventory by Whetten and Cameron (2011) to measure the level of managerial skills possessed by an individual, yielding consistency coefficients above 0.80; an example of this is Callohuanca and Tantalean (2020) and Arana (2021).

Virtuous leadership

The "Virtuous Leadership Questionnaire" (VLQ) as referenced by Wang and Hackett (2016), has been used to measure the degree of virtuousness in leadership, yielding consistency coefficients above 0.75, as demonstrated by Amorim, Ferreira, and Valentin (2019) and Riggio (2010). From this questionnaire, the questions pertaining to the 5 virtues proposed in this research were taken.

It was organized into 5 dimensions: 1) Temperance; 2) Humility; 3) Prudence; 4) Justice; and 5) Fortitude; each dimension containing 4 items. The scores for each question are averaged to construct the mentioned observable variable; therefore, it is inferred that a score below 1.5 indicates a lack of virtue; a score between 1.5 and 3 indicates a developing virtue, and a score above 3 signifies a developed virtue. (Riggio, 2010)

In this study, two statistical techniques were used to calculate reliability. First, Cronbach's Alpha coefficient was used to estimate the instrument's internal consistency and evaluate the covariation of each item, determining the degree to which the construct is reflected in the items (Oviedo and Campo, 2005). Second, McDonald's Omega index was applied to strengthen the instrument's reliability. This tool provides several advantages over Cronbach's Alpha, such as using factor loadings for more stable calculations and a more precise measure of reliability, and it is not dependent on

the number of items in the instrument or influenced by the number of response options (Ventura and Caycho, 2017).

Table 1

Reliability coefficients resulting from the tools used to determine the consistency, stability and accuracy of measurement instruments.

	Reliability Coefficients		
Instrument	Cronbach's alpha	Standardized Cronbach's alpha	McDonald's Omega
Brain Dominance	.72	.71	.72
Management skills	.74	.69	.77
Virtuous Leadership	.79	.77	.75
Total reliability	.81	.76	.81

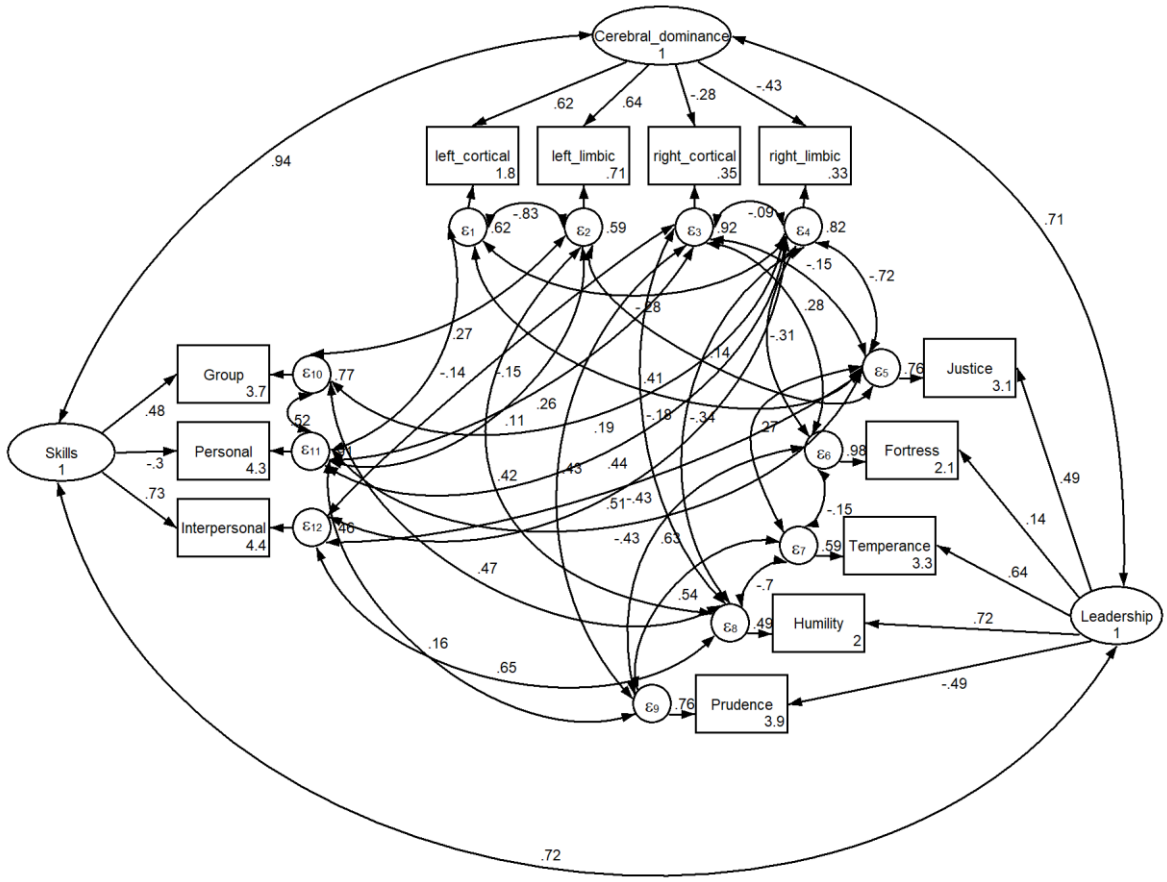
Table 1 demonstrates that the relationships between the covariations and correlations of the items are sufficient for carrying out a statistical analysis of the phenomenon in question. Values higher than 0.70 imply that the instrument is suitable for evaluating its various dimensions. (Celina and Campo, 2005).

Results

An analysis using structural equations was carried out to detect possible relationships and patterns among the variables under investigation.

Figure 2

Structural equation model of the constructs studied



Note: All observable variables and covariations have a p value < 0.05.

The evaluations performed to analyze the reliability of the structural equation model were successful, given that two tests were conducted to confirm the model fit adequacy:

1) The overall model's p-value was 0.19 and,

2) For the Chi-square test between its degrees of freedom $\left(\chi^2/_{df}\right)$, a value of 1.26 was obtained; additionally, *Root Mean Square Error of Approximation* (RMSEA) value is 0.04 and its probability value is 0.55.

According to Ruiz, Pardo, and Martín (2010), confidence intervals for the probability value of the general model should fall between 0.05 and 0.25. They also suggest that the $\left(\chi^2/_{df}\right)$ d should range between 1 and 3. For the *Root Mean Square Error of Approximation* (RMSEA), values below 0.08 are deemed acceptable, particularly between 0.05 and 0.10 for more complex models. Similarly, they highlight that the probability value of the RMSEA should be greater than 0.05. Based on these guidelines, it can be inferred that the proposed model adequately explains the observed data.

To determine if the model fit the sample, the *Comparative Fit Index* (CFI) test was conducted, yielding a value of 0.99, confirming the existence of relationships between the observed variables. Finally, the *Standardized Root Mean Square Residual* (SRMSR); test was used, which evaluates the

average discrepancy between observed correlations and correlations estimated by the model, resulting in a value of 0.03; indicating a reliable model for forecasting purposes.

Figure 2 shows a high correlation (0.94) between cerebral dominance and managerial skills; likewise, there is a notable correlation between cerebral dominance and virtuous leadership (0.71). The correlation between virtuous leadership and managerial skills is 0.72; suggesting that the employee's perception of "good or bad" leadership and the managerial skills of the administrator are influenced by the employee's brain dominance.

Regarding the employee's cerebral quadrants, there is a positive correlation between the left cortical and the virtue of justice (0.41). This is because individuals with a dominant tendency in this brain region typically exhibit behaviors of evaluation, analysis, reasoning, and logic (Méndez, 2012). Consequently, employees with this dominance are likely to seek equitable and appropriate treatment from their supervisor based on their actions.

Thus, a positive indirect link is formed between the left cerebral hemisphere, the concept of justice, and the skill of interpersonal leadership (0.41*0.51=0.20). This is because the employee perceives that interpersonal competence fosters conflict resolution, communication, and motivation among coworkers. Success in this endeavor largely hinges on the leader maintaining an impartial and reasoned approach in their decision-making and in guiding their team. (Nava, 2017).

Figure 2 illustrates a positive correlation between the right cerebral hemisphere and personal managerial skills (0.44). This correlation can be explained by the inclination of individuals with a dominance in the right hemisphere to be outgoing and spontaneous, with a tendency to foster harmony and share ideas (Madrigal et al., 2009). Moreover, they typically prefer human interaction and teamwork. These traits align with the role of a manager's personal managerial skills, which entail developing strategies to manage stress and resolve conflicts, crucial aspects of effective leadership. (Whetten and Cameron, 2011).

On the other hand, the virtue of humility is characterized by recognizing one's own limitations and engaging in reflective examination of opinions and ideas; this stands in contrast to the behavior and perception associated with the right limbic hemisphere, as some extroverted and spontaneous individuals tend to be impulsive and unreflective (Sánchez, Retana and Cruz, 2006). Therefore, the relationship between the right limbic hemisphere and the virtue of humility is negative (-0.34).

Consequently, a manager seeking a better assessment in the virtue of humility must show willingness to change, generosity, proficiency in team building, a service-oriented attitude, and effective delegation of duties; as highlighted by (Argandoña, 2013); nonetheless, this is also supported by the direct correlation between group leadership skills and the virtue of humility (0.47).

If the employee were to have a predominance in the right cortical region, this would lead the individual to prefer leaders with a certain degree of originality in decision-making; coupled with a liking for risk and articulate discourse capable of conceptualizing and synthesizing conflict, all aimed towards a forward-thinking vision (Sánchez, 2015). Therefore, the virtue of prudence exhibits an appropriate correlation with respect to this quadrant (0.43). This is because the employee evaluates these characteristics and perceives that the decisions made by the leader are suitable and made at the right time.

According to Sáenz and Zurita (2021) , temperance is considered essential for prudence, as calmness and serenity are crucial behaviors for making accurate and timely decisions, an assertion upheld by

the model; given that prudence correlates directly with temperance (0.54); therefore, if a manager aims to establish authority legitimacy with an employee demonstrating right cortical predominance, the ability to conduct critical analysis and respond reasonably to tense situations is imperative.

As for the left limbic quadrant, a favorable correlation is assumed for group management skills (0.27) and concurrently, for personal management skills (0.11). This can be explained by the fact that the employee will emphasize characteristics perceived in the manager such as: 1) planning, 2) administration, and 3) organizational sense as a manager with a systematic and orderly approach will handle stressful situations better and make analytical decisions instead of reacting impulsively. (Lozano and Fuentes, 2005).

Along these lines, it can be argued that to have a favorable perception of employees with a predominance in the left limbic quadrant, it is necessary to score high in both group and personal skills; to achieve this, the manager must be prudent in their actions (0.16) and humble in their demeanor (0.47). This correlation is visualized in figure 2; however, Gil, Alcover, Rico, and Sánchez (2011), allude to the importance of these two traits in developing these managerial skills.

Personal proficiency is highly regarded in an organizational setting, as it promotes serene and concise communication among team members. Open and effective communication is essential for problem-solving, informed decision-making, and collaborative project execution. (Lachira et al., 2020).

Within the framework of effective communication, temperance and justice are pivotal in enabling us to express our ideas, opinions, or sentiments calmly and assertively, while avoiding impulsive or emotional reactions (Bueno, 2018). Consequently, there exists a positive indirect correlation between the virtue of temperance (0.35) and justice (0.36) towards personal skill (0.12).

The connection between interpersonal competence and the virtue of justice holds significant importance in fostering an ethical, inclusive, and productive work environment. As asserted by Gallego and Vidal (2018), this can be substantiated by the direct positive correlation (0.41) between the virtue of justice and interpersonal leadership ability. This ability enables managers to mediate and find collaborative solutions, crucial for addressing conflicts in a fair and equitable manner; essential for fostering a harmonious work atmosphere (Whetten and Cameron, 2011).

Likewise, a leader who listens to and respects the viewpoints of their team, while advocating for fairness and making decisions with integrity, establishes a work environment that fosters trust and commitment among employees.

The cognitive preferences of employees, as evidenced by their cerebral dominance, along with their perception of leadership in conjunction with managerial skills, are determining factors in their level of motivation, commitment, and performance in Mexican companies. This study underscores that the connection between these three constructs impacts employees' attitudes towards their work and their work environment.

Understanding these preferences can enable companies to tailor their leadership techniques and human resource management practices to meet the specific requirements of their employees, thereby enhancing their motivation, commitment, and job performance (Cabana, Rivera, Véliz, and Aguilera, 2023). Ultimately, this fosters a more productive, inclusive, and gratifying work environment within Mexican businesses.

Conclusions

The analysis of brain dominance and its relationship with leadership and managerial skills offers a unique perspective on how employees perceive and respond to leadership within the Mexican labor market context. This research reveals that the individual cognitive patterns of the studied workers can significantly influence their perception of leadership, which in turn can impact their performance and work engagement. In a country like Mexico, where cognitive and cultural diversity is a reality, understanding how these differences influence workplace dynamics is fundamental to promoting inclusive and productive work environments.

Furthermore, the study highlights the importance of virtuous leadership as an essential component for promoting ethical and responsible practices within organizations in Mexico. The positive relationship between virtuous leadership and the perception of leadership suggests that employees value integrity and ethics in their leaders, which can significantly impact organizational culture and talent retention in the Mexican labor market.

This research not only contributes to the theoretical understanding of leadership and managerial skills but also offers practical insights that can inform human resources policies and practices aimed at promoting a fairer, more inclusive, and productive labor market in Mexico. By recognizing and valuing the cognitive diversity of employees, organizations can cultivate work environments that foster innovation, commitment, and professional growth in the country.

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