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Artículos

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El liderazgo frente a la transformación digital en una empresa de manufactura ecuatoriana en 2020

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Abstract: The present research focused on determining the predominant leadership style in the productive areas of an Ecuadorian manufacturing company, and the level of digital transformation during the year 2020. The study was developed through cross-sectional descriptive research. The multifactorial leadership questionnaire and key performance indicators were used as instruments, which were applied digitally using Google forms. The population studied was 151 workers and the sampling technique was probabilistic. The results allowed determining that 74% of the transformational leadership guidelines are practiced, 77% of transactional leadership and 9% of *laissez-faire*. The level of digital transformation had an increase of 19% in the fourth quarter compared to the first quarter of the year, evidencing in practice the implementation of automation mechanisms, use of digital media and documents and implementation of technology. It was concluded through the literature and theoretical review that to face the technological advance, the transformation leadership style with all its dimensions is the most appropriate because it promotes development, innovation and knowledge management.

Keywords: Leadership styles, Digital transformation, Multifactor leadership questionnaire, Key performance indicators.

Resumen: La presente investigación se centró en determinar el estilo de liderazgo predominante en las áreas productivas de una empresa de manufactura ecuatoriana, y el nivel de transformación digital durante el año 2020. El estudio se desarrolló mediante la investigación descriptiva transversal. Se utilizó el cuestionario multifactorial de liderazgo y los indicadores clave de rendimiento como instrumentos, mismos que fueron aplicados digitalmente mediante formularios de Google. La población estudiada fue de 151 trabajadores y la técnica de muestreo fue probabilística. Los resultados permitieron determinar se practican los lineamientos del liderazgo transformacional en un 74%, del liderazgo transaccional en un 77% y 9% del *laissez-faire*. El nivel de transformación digital tuvo un incremento de 19% en el cuarto trimestre comparado con el primer trimestre del año, evidenciando en la práctica la implementación de mecanismos de automatización, uso de medios y documentos digitales e implementación de tecnología. Se concluyó a través de la revisión literaria y teórica que para afrontar el avance tecnológico el estilo de liderazgo transformación con todas sus dimensiones es el más adecuado ya que fomenta el desarrollo, innovación y gestión del conocimiento.

Palabras clave: Estilos de liderazgo, Transformación digital, Cuestionario Multifactorial de liderazgo, Indicadores clave de rendimiento.

INTRODUCTION

The present research work aims to identify the leadership style that predominates in the productive and administrative areas of an Ecuadorian manufacturing company in the year 2020; as well as to determine the appropriate methodology to face the digital transformation, linkage of new technology and incursion into the so-called Industry 4.0, through a qualitative research. To achieve this, it seeks to conduct a thorough preliminary analysis of the predominant leadership style in the organization through the application of the Multifactor Leadership Questionnaire (MLQ) as a data collection tool, once a preliminary study is executed, and after having determined the leadership style as a starting point of this work, a measurement of the implementation and internal progress of the digital transformation and technological changes is performed by describing the organization's own key performance indicators in the short term. Finally, through theoretical research, information on leadership theories is gathered to define the components that encompass and determine the style that contains the characteristics required to cope with the digital transformation.

In the last twenty years the Internet has considerably transformed the lifestyle of human beings, habits and the way in which personal and work activities are carried out, as well as allowing the development of important areas such as engineering, medicine and education. Currently, the fourth industrial revolution, the globalized, connected world and the "Internet of things" allow communication and relationship between thousands of people and objects in real time regardless of distance. In the same way, the digital transformation has significantly influenced people and the skills they must develop, especially if they are to take on challenges such as being business leaders.

Business models have also been adapting and in turn the value chains, most sectors point to technological change, data analysis and real-time information to predict changes that in the past were considered stable and today by the reality of the environment are complex and volatile. In a study that deals with digital transformation strategies in the business framework, Matt, (2015) mentioned that the transformation from practically manual processes to digitized and more autonomous processes require following an appropriate leadership strategy, which influences and impacts from its implementation and in the long term.

The people in charge of leadership management generally do not have the technical knowledge or the capacity to supervise such technological change, so it is necessary that this process, which involves acquiring new knowledge, be flexible in order to give it significance and to avoid increasing execution costs. In addition, they must acquire new skills and knowledge in the process or this change can lead to significant cost overruns and poor execution. On the other hand, if the leadership style is

not aligned with the digital transformation or the strategy is not effective, the organization may be affected by problems that will arise the process and mark it for years to come (Allio, 2015, p. 34).

Within the above context, this Ecuadorian company dedicated to manufacturing, has always sought to maintain at the technological forefront the forms of production and management. To achieve its prospect of being an outstanding, prosperous and prepared company for the technological advances that are coming with the so-called industry 4.0, it has opted for the use of fully automated machinery, the development and implementation of monitoring, control and data acquisition systems, as well as embedded computer systems in the different productive and administrative areas. Roles within the company have also been adapting to the technology implemented, considerably improving production times, ergonomics in work activities, quality control, internal communication and compliance with objectives.

Leadership has been a little explored topic despite the organizational changes that have been experienced, as is the case of personnel recruitment, which has marked a significant generational difference among employees, as well as the implementation and socialization of computer tools for management administration. Therefore, it is important for the organization to have a clear view of the predominant leadership style in the operational and administrative areas and to establish the objectives of digital transformation for the year 2020 in order to properly determine a strategy that allows developing the synergy between technological change and leadership methodology to manage the company, taking into account the perspective of employees and the recommendation established by the theoretical foundation.

In this way, it will be possible to have more control and empowerment of workers, further develop and ingrain organizational values, preparing employees to face the technological and generational challenge through the standardization of areas in terms of leadership, as well as the familiarization of digital tools that can be implemented in the company in the short term. Sow, (2018) mentioned that the digital transformation process needs the company to be prepared for changes and interruptions in its routine activities and processes during short periods of time and that could even take several months, which entail the migration of information to database systems, optimization and automation processes to improve efficiency indexes and development of activities that will benefit the internal environment.

Based on the above premises, this research seeks to determine the leadership styles that predominate in the productive and administrative areas of an Ecuadorian manufacturing company, to measure the internal progress of digital transformation that the company is experiencing through key performance indicators and to relate this internal perception of the organization with the theoretical foundation to define the optimal leadership model that can effectively address the technological and digital changes of today.

MATERIALS AND METHODS

The research design constitutes a systematic process, whose methodology is oriented to find the solution of problems or questions, which are satisfied through the production of new knowledge. For the present study, it is proposed to follow the quantitative type of research, using the Multifactorial Leadership Questionnaire as instruments for collecting information and through the analysis of Key Performance Indicators applied to all the productive areas of the company. Abreau (2012) mentioned that, the objective of implementing this design and type of research is not limited only to data collection, but also characterizes, defines and analyzes in depth aspects such as behavior, customs, activities and dominant characteristics in a social environment, in the same way, it allows issuing predictions and relationships between various phenomena. In addition, quantitative research has been beneficial because it allows to approach social issues and problems from other perspectives, using computer technology for data collection and analysis.

Given the nature of the study, it has been established that the design to be followed corresponds to that of a cross-sectional descriptive research. Abreau (2012) mentioned that this type of research, also known as diagnostic research, commonly used to study social phenomena, allows characterizing the situational state, highlighting the most relevant and differentiating aspects. It follows a deductive logic, since it aims to establish the relationship between leadership and digital transformation over a period of time, which are currently necessary aspects for organizational development.

The variables under study affect all 151 people, so it is considered, to select the sample, to apply the probability sampling technique. Considering that the population corresponds to the 151 workers, the totality has been selected to be able to study in them, the components previously mentioned where each individual has the same opportunity to be selected.

The validity of the aforementioned instruments is based on their application since they were proposed in 1985. Molero (2010) mentioned that, the Multifactorial Leadership Questionnaire has been implemented in different continents and in different languages, adding up to the date of his study a total of 182 instruments applied in research on leadership-oriented topics. On the other hand, Suarez (2017) demonstrated the validity of the instrument in the Ecuadorian scenario that, in addition to having been reviewed by experts, its implementation and results showed consistency with the environment and the reality studied. The reliability of the information and instruments used in the research lies mainly in the impartiality of the study since, by analyzing the organization and its collaborators from an external perspective, there is no influence or manipulation of the information collected through the questionnaires and performance indicators. Likewise, the instruments comply with the guidelines established for their implementation. For authors such as Diazy, Berrecoso (2020); Diaz-Martín et al (2019) and Corral (2008)

mentioned that the questionnaire has a well-defined purpose, has a clear objective, the questions have been structured and validated by previous studies, ensuring objectivity in its resolution and analysis.

The reliability of the instrument, which has been applied in several investigations, is verified. According to, Vega (2004) mentioned in his research on the adaptation of the Multifactorial Leadership Questionnaire of Bass and Avolio, the instrument was submitted to verification whose reliability indicator, Cronbach's Alpha, has a value equal to 0.9 which, according to his interpretation, indicates that the instrument is reliable and homogeneous. For his part, Suarez (2017) submitted the instrument to reliability verification in his leadership study applied to the Ecuadorian reality, obtaining a similar result. Using the IBM SPSS statistical analysis tool, it was determined that the Cronbach's Alpha coefficient of the multifactor leadership questionnaire is 0.89 and, when contrasted with the aforementioned studies, the questionnaire is reliable.

On the other hand, the use of key performance indicators, called KPIs, have been used to study Ecuadorian companies in approximately 4200 researches present in digital repositories. In the research about Digital Maturity in manufacturing companies, Haro (2019) mentioned that, to validate the instrument, the judgment of two to twenty experts is required, who in such research corroborate the validity to measure digital transformation maturity. Similarly, key performance indicators have been used in the company to measure the percentage of digital transformation as part of one of the strategic components.

RESULTS

The study universe is made up of 151 employees who are part of the payroll of the Ecuadorian manufacturing company. Through the probabilistic technique described in previous sections, each individual has the same opportunity to be selected for the study. The collaborators are contacted through a verified e-mail address provided by the Human Resources area, who periodically update this information. This ensures that the study sample receives the instrument for measuring the variables of leadership and digital transformation.

The Multifactorial Leadership Questionnaire is a tool that allows to quantitatively know through its application the dimensions of leadership practiced in the different productive areas of the organization. The answers to the 45 proposed questions are weighted with values between 0 and 4 according to the Likert frequency. Once the questionnaire is applied, the answers of the 151 employees of the company are recorded and grouped in frequency tables to be analyzed through statistical tools.

The modal distribution is a tool that allows the statistical analysis of frequency tables in such a way that, from a set of values, it is possible to determine the most representative one, that is, the one with the highest frequency or repetition. There can be several types of mode according to the number of times the data is repeated, so it can be: unimodal, bimodal

or multimodal. The advantage of using this statistical tool lies in the fact that the results obtained from the application of the questionnaire are subjective to the perception of each collaborator, so it is important that the representative values of a set of data are not affected by isolated extremes of the individual results, but on the contrary, to determine the one that represents, through its frequency, the set of individuals studied. To achieve this, the SPSS statistical analysis software is used to collect the information and perform the programming to determine the statistical results. Additionally, to avoid biases in the statistical analysis, a contrast with the arithmetic mean, an analysis of the standard deviation and kurtosis is performed.

Below are the statistical values resulting from the analysis of the dimensions and leadership styles, which are then transformed into values that show the percentage level of belonging and implementation of leadership in each productive area of the company.

Table 1 summarizes the modal value, arithmetic mean, standard deviation and kurtosis determined for the set of questions that make up the Transformational Leadership dimensions corresponding to the company studied globally. It can be seen that the value of the arithmetic mean is close to that of the mode and in turn the analysis of the standard deviation and kurtosis confirm that the results of the survey are accumulated between the aforementioned values.

Table 1

Statistical results of the Transformational Leadership dimensions.

	Idealized Influence	**Inspirational Motivation**	**Intellectual Stimulation**	**Individual Consideration**
N. answers	150	150	150	150
Media	3.12	3.41	2.91	2.13
Fashion	4	4	3	2
Standard deviation	1.01	0.77	1.05	1.18
Kurtosis	0.71	1.75	0.81	0.77

Table 2 presents the statistical results of transactional leadership, where by interpreting the standard deviation and kurtosis the data are concentrated around the mean.

Table 2
Statistical results of the Transactional Leadership dimensions.

	Contingent reward	Management by active exception
N. answers	150	150
Media	2.13	2.43
Fashion	0	3
Standard deviation	1.18	1.34
Kurtosis	0.77	-0.79

The dimensions corresponding to Laissez-Faire leadership are analyzed in a generalized manner in Table 3, where the values of the responses representing the company are determined through the mode and the arithmetic mean. The results of the standard deviation and kurtosis confirm that the responses revolve around the mean and mode.

Table 3
Statistical results of the Laissez-Faire Leadership dimensions.

	Direction by passive exception	Laissez-faire
N. answers	150	150
Media	0.65	0.78
Fashion	0.00	0.00
Standard deviation	0.97	1.02
Kurtosis	6.32	1.35

Subsequently, a percentage analysis is performed in such a way that the sum of the maximum frequency of each of the questions corresponding to a leadership dimension or style corresponds to 100% of belonging to that leadership practice. And by means of the mathematical establishment of a proportionality relation, the percentage value of belonging can be determined according to the results obtained corresponding to the group of questions belonging to a leadership dimension.

The percentage values of belonging to the dimensions of transformational leadership are summarized in Table 4.

Table 4

Percentage of productive areas belonging to the dimensions of transformational leadership.

Area / Dimension of Leadership	Idealized influence	Inspirational motivation	Intellectual stimulation	Individual consideration
Administration	90.62%	100%	93.75%	**56.25%**
Feeding	87.5%	81.25%	75%	**43.75%**
Pillows	59.37%	81.25%	68.75%	**68.75%**
Distribution	81.25%	93.75%	81.25%	**50%**
Assembly	71.87%	87.5%	68.75%	**43.75%**
Foam	68.75%	81.25%	81.25%	**31.25%**
Linings	78.12%	87.5%	68.75%	**37.5%**
Maintenance	84.37%	100%	81.25%	**56.25%**
Operations	87.5%	87.5%	68.75%	**75%**
Panels	81.25%	93.75%	68.75%	**50%**
Human Resources	78.12%	93.75%	81.25%	**62.5%**
Cutting Workshop	75%	93.75%	43.75%	**37.5%**
Upholstery	75%	100%	68.75%	**37.5%**
Sales	90.62%	100%	68.75%	**43.75%**

In the same way, Table 5 shows the percentage of productive areas belonging to the dimensions: contingent reward and management by active exception, typical of transactional leadership.

Table 5

Percentage of productive areas belonging to the dimensions of transactional leadership.

Area / Dimension of Leadership	Contingent Reward	Management by active exception
Administration	100%	75%
Feeding	93.75%	43.75%
Pillows	75%	62.5%
/Distribution	75%	62.5%
Assembly	93.75%	62.5%
Foam	75%	87.5%
Linings	68.75%	75%
Maintenance	87.5%	75%
Operations	87.5%	75%
Panels	87.5%	62.5%
Human Resources	81.25%%	62.5%
Cutting Workshop	75%	62.5%
Upholstery	87.5%	81.25%
Sales	87.5%	87.5%

Finally, the statistical evaluation corresponding to the laissez-faire leadership style is shown in Table 6.

Table 6

Percentage of productive areas belonging to the dimensions of laissez-faire leadership.

Area / Dimension of Leadership	Direction by passive exception	Laissez-Faire
Administration	6.25%	0%
Feeding	18.75%	6.25%
Pillows	25%	37.5%
Distribution	6.25%	12.5%
Assembly	6.25%	0%
Foam	12.5%	18.75%
Linings	6.25%	6.25%
Maintenance	0%	12.5%
Operations	0%	12.5%
Panels	12.5%	6.25%
Human Resources	12.5%	12.5%
Cutting Workshop	6.25%	12.5%
Upholstery	6.25%	12.5%
Sales	0%	0%

Once the results of belonging to each of the leadership dimensions have been analyzed, we proceed to determine the percentage value of the leadership styles that are practiced in the different productive areas specifically and the value considering the totality of the manufacturing company located in Ecuador. Table 7 shows the percentage results obtained.

Table 7

Percentage of belonging of the productive areas of the company to the leadership styles.

Area/ Leadership style	Transformational	Transactional	Laissez-faire
Administration	87.5%	93.75%	3.12%
Feeding	73.43%	84.37%	12.5%
Pillows	73.43%	59.37%	31.25%
Distribution	75%	68.75%	9.375%
Assembly	73.43%	78.12%	3.125%
Foam	67.18%	81.25%	15.625%
Linings	65.62%	71.87%	6.25%
Maintenance	81.25%	81.25%	6.25%
Operations	79.68%	81.25%	6.25%
Panels	75%	75%	9.375%
Human Resources	79.68%	71.87%	12.5%
Cutting Workshop	62.5%	68.75%	9.375%
Upholstery	73.43%	84.37%	9.375%
Sales	75%	87.5%	0%
Total	**74.44%**	**77.67%**	**9.6%**

As for, the digital transformation of the company is evidenced in the comparison of the statistical indicators of the percentage of tasks that require a technological or digital component compared to the total daily activities that are performed in the workplaces corresponding to each productive area, information that can be visualized in Table 8. The measurements of the indicators were made during the first and last semester of the 2020 period in order to establish a comparison of the initial and final state of the company in the mentioned time. Table 8 below shows the percentage of digital transformation of both measurements and the variation between the time periods.

Table 8

Percentage of digital transformation in the productive areas of the Ecuadorian manufacturing company during the first and last quarter of 2020.

Area/ Period	1st quarter	4th quarter	Variation
Administration	60%	80%	20%
Feeding	33%	67%	33%
Pillows	50%	57%	7%
Distribution	43%	57%	14%
Assembly	36%	45%	9%
Foam	60%	73%	13%
Linings	50%	60%	10%
Maintenance	11%	70%	59%
Operations	67%	83%	17%
Human Resources	63%	88%	25%
Panels	36%	45%	9%
Cutting workshop	56%	67%	11%
Upholstery	20%	30%	10%
Sales	33%	83%	50%
Total	**44%**	**63%**	**19%**

In the productive areas of the manufacturing company located in Ecuador, different dimensions of leadership are rooted in different proportions. Among the most outstanding are: inspirational motivation, which is characterized by generating confidence, enthusiasm and adequately managing communication in order to enhance the vision of the organization. Goh and Richards (1997) considered that the vision and motivation shared between the leader and the followers allows establishing a preception of the current situational state and clarifying the necessary activities to be developed to reach the desired goal, thus fostering the need to improve and learn. Secondly, idealized influence, which is part of the transformational leadership style, is directly related to the personality of the team leader. Goleman (2004) considered that the leader is capable of transmitting security, generating self-confidence among collaborators, promoting a culture open to learning, motivation,

efficiency and personal effectiveness due to the great capacity to manage his or her own emotions, attitudes reflected in the leader's own charisma towards the group.

The leadership of this Ecuadorian manufacturing company also has a transactional style component, which is based on supervision of employees, performance measurement and reward for meeting objectives. The dimension of this leadership style corresponds to contingent rewards. According to Mendoza (2006), this dimension of leadership is typical of leaders who orient their practices to recognize achievements after having clearly established the intended objectives. As it is an exchange between leaders and collaborators, it constitutes a transaction by way of a reward that seeks to motivate each of the members after having performed the tasks, obligations and objectives set. In the same context, there are areas whose transactional leadership consists of the dimension called management by active exception. This dimension is characteristic of leaders whose thinking is oriented to the correction of failures. Molero (2010) in his research mentioned that this dimension of leadership seeks to correct deviations through continuous supervision to achieve the objectives and expected levels of performance.

In general, the productive areas of the company share characteristics of transactional and transformational leadership in the proportions described above; however, in certain divisions of the organization there are dimensions of laissez-faire leadership. This dimension of leadership is characterized by a passive leader, who does not get fully involved with his team and delegates important decisions without major supervision.

In conclusion, it was determined that the manufacturing company located in Ecuador demonstrates 77% of transactional leadership and 9% of the characteristics established by the laissez-faire style.

In terms of digital transformation, through the key performance indicator analyzed individually for each productive area, it was determined that it is in an advanced stage, since in the period analyzed corresponding to the year 2020, most of the activities carried out at the administrative and productive levels have a technological component, with 63% of the tasks that are currently carried out on a daily basis involving technological, digital, automated or at least semi-automated processes, 19% more than in the first quarter of 2020.

The digital processes and automation of jobs with booming technology such as: robots, RPA, artificial intelligence, machine learning, software and computational algorithms have allowed humanizing tasks in a certain way, as those considered repetitive, dangerous or involving physical effort have been replaced by technology, improving efficiency and quality of life of workers. The technological incursion requires a degree of digital literacy to understand and coexist with this emerging reality that affects both workers and the way the company is managed.

Similarly, the effects of the pandemic on the production environment and jobs during the second and third half of the year forced the company to carry out its operations remotely in order to ensure the development of the plant. This is why the health factor and the mobilization restriction

are considered among the main triggers for the digital transformation experienced by the company under study.

CONCLUSIONS

The Ecuadorian manufacturing company is characterized by the formation of human talent and leaders so that, according to the model of leadership levels proposed by Collins (2001), leaders can be formed through its passage through 5 levels, where they can be able to develop and acquire skills and abilities that allow them in the first instance, understand the basis of the organization and the processes that allow them to develop their economic activity, to subsequently establish a synergy between humility, will and knowledge to achieve organizational objectives, to be resilient to changes and to be able to face complex challenges such as technological, innovation, generational and environmental changes.

Through the present research, the application of the multifactorial leadership questionnaire and the statistical analysis, it was possible to determine that, in the different productive areas, several leadership styles are practiced simultaneously in different proportions. Thus, in general, 74% of the fundamentals established by the transformational leadership style are put into practice, approximately 77% of transactional leadership and at least 9% of the laissez-faire leadership style.

On the other hand, the company has experienced an increase in terms of digital transformation in 2020, since through the quantitative analysis of key performance indicators it was determined that, in the first quarter of the year, 44% of activities contained a digital, technological or automation component while, in the last quarter of the same period, it was determined that the digital transformation rate was 63%. The organization has digitally transformed its activities by approximately 19% over the course of 2020.

The research revealed that the most outstanding leadership styles are transformational and transactional leadership, so that, according to the study, the theoretical foundation and the internal reality of the company, transformational leadership is the most appropriate style to cope with the development and digital and technological transformation. Therefore, through the different dimensions, the leader is able to establish motivational and inspirational practices and encourage the development of trust, commitment and creativity through individualized monitoring, emotional and even intellectual stimulation to properly manage knowledge.

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