Research Article

An Empirical Study on Virtual Team Leadership Perception

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Abstract

Virtual work is one of the most important organizational issues of present times. The growing demands of organizational competitive advantage observed in the current scenario in a global and digital context, where people are increasingly physically distant, new and demanding challenges are posed to employees and companies, particularly with regard to the development of teleworking activities and the respective virtual leadership (e-leadership). The main objective of the present study is to analyze the perceptions of respondents regarding the leadership style of their team leader in national and multinational companies, in the IT - Information Technology sector. From a sample consisting of 167 IT employees in a virtual work context, who answered the MLQ – Multifactor Leadership Questionnaire 5X MLQ by Avolio and Bass (2004), based on Full Range Leadership model, we analyze the perceptions of transformational, transactional, and laissez-faire leadership styles, with the results of leadership – extra-effort, effectiveness and satisfaction. From our results, it is possible to evidence that the more frequent the transformational leadership behaviors in the virtual teams, the higher the results achieved by the subordinates, on the other hand, the more frequent the laissez-leadership behaviors, the lower the results achieved by the team members. With this study, was intended to contribute to the expansion of knowledge about leadership in a virtual context and, consequently, to a greater awareness about the demands of virtual contexts and the updating of practices by leaders.

Keywords: Virtual leadership, E-leadership; Full range leadership model; IT Sector

Introduction

Never as today, the theme of leadership in virtual teams has been so relevant, bringing big challenges to organizations and employees. In the actual global and digital context, in which people are physically distant, there are several challenges for virtual leadership, which include the need to develop skills within the organizational activities. The virtual leader will be required to have a strong component to act in technologically complex environments (Agarwal, Ferdousi, Stahl, John and Nalven,

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2020 ; Winter, 2020). Organizational success largely depends on leadership behavior, although it is still unclear what kind of leader and, more specifically, what leadership skills, behaviors or practices contribute to effective virtual teams (Konradt and Hoch, 2007).

The evolution of the leadership concept over the decades, demonstrates the depth of research into the concept and the perceptions fluctuation. In the first phase, trait theory, behavioral theory and the situational theories stood out (Judge et al., 2004; Lussier and Achua 2010; Yukl, 2013), however the organizational growing complex and dynamic context, changes and uncertainties, would reveal an incompatibility with these traditional hierarchical views, which define leadership as unidirectional, drawing a distinct line between leaders and followers. This fact led to a change in the focus of the leaders´ characteristics and behaviors, rising the need for new approaches that would allow dealing with the new reality of organizations and businesses, resulting in more relevant definitions of leadership, followers and situations (Benmira and Agboola 2021) . The new leadership links concepts such as charismatic, visionary, inspirational, values-oriented, and change-oriented leadership, provides more attention to charismatic and affective elements of leadership. These approaches include charismatic, transformational, transactional, shared, servant, authentic and level 5 leadership (Avolio, Walumbwa and Weber, 2009; Mathews, 2016; Turano and Cavazotte, 2016).

On the other hand, the technological development and automation allowed organizations to conduct their work across time and space, eradicating time and space barriers. These configurations revolutionized the workplace, providing a high level of responsiveness and flexibility. Consequently, the communication technologies used in the virtual work environment provide a new context for leadership and teamwork. Thus, the type of leadership that leaders must demonstrate must be different in virtual teams (Konradt and Hoch, 2007; Yukl, 2013; Mehtab,

Rehman, Ishfaq and Jamil, 2018). Aggarwal (2015) states that the main objective of leaders has not changed, but the use of technology is gaining space to communicate and transmit knowledge. The main difference between them exists in terms of skills, attitudes, knowledge, and their professional and personal experiences regarding the use of technologies.

Virtual leadership in the IT sector

Kerfoot (2010) defines virtual leaders as "border managers", who inspire people at a distance to develop self-management skills, stating that virtual leadership increasingly replaces traditional leadership because the technology advancement allows supporting new communication models. Virtual leadership can occur at any hierarchical level of the organization, involving electronic, one-to-one and one-to-many interactions (Avolio, Kahai and Dodge, 2000; Kerfoot, 2010). Avolio, Kahai and Dodge (2000) chose the term e – leadership to incorporate a new approaching leadership context.

Gyanchandani (2017) investigated the leadership styles used in the IT sector and their effects on team performance variables, such as effectiveness, extra effort and satisfaction. The results show that variables such as idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration are strongly linked to team performance, promoting performance beyond expectations. In the same context, several other authors conducted their studies based on the Bass and Avolio (2000) multifactor questionnaire (MLQ-5X) that integrates aspects of transformational, transactional, and laissez-faire leadership. Kindarto, Zhu and Gardner (2020) applied it to 636 IT employees, showing that transformational leadership was positively related to team performance, laissez-faire leadership had a negative relationship and transactional leadership had a significant negative relationship. Quintana, Park and Cabrera (2015) used the MLQ-5 To study the leadership influence on outcomes, including extra effort, effectiveness and satisfaction by leaders, the result of the study indicates

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that the "idealized attributes" of transformational leadership and the "contingent reward" of transactional leadership are the most important factors that positively affect the three outcomes.

Ruggieri (2009) in his study, which involved 60 psychology students, aimed to analyze some important characteristics of transformational and transactional leadership in virtual contexts. The results show the emergence of the transformational leader as being more charismatic, less task-centered, more relationship-oriented and more future-oriented. According to the authors, the results of this study were consistent with the literature, extending the conclusions reached in traditional contexts to virtual contexts. Joshi, Lazarova and Liao (2009) demonstrated that the presence of an inspiring leadership –a factor related to transformational leadership – significantly influenced team members' trust and commitment to virtual environment teams. This positive association between inspiring leadership, trust and employee commitment is more relevant in teams that were more dispersed. That is, while inspiring leadership is vital for all work environments, its relevance is particularly highlighted in virtual teams or in a highly dispersed work context.

Hypotheses and Methodology

Hypotheses formulation

The general objectives of the present study intend to investigate: (i) which leadership style (transformational, transactional and laissez-faire) has the greatest positive impact on leadership results (effectiveness, extra effort and satisfaction) in a IT virtual context; (ii) what sociodemographic variables (age, gender, number of years of professional experience) influence the perception of transformational, transactional and laissez-faire leadership styles in a IT virtual context.

Based on the objectives, it is intended to evaluate the following hypotheses:

- H1: There are no differences in the perception of transformational, transactional, and laissez-faire leadership styles between female and male subordinates.

- H2: The age of the subordinates does not influence the perception of transformational, transactional, and laissez-faire leadership styles.

- H3: The number of years of experience of the subordinates does not influence the perception of the transformational, transactional, and laissez-faire leadership style.

Martinez-Leon et al. (2020) analyzed prevailing leadership styles and gender differences using the MLQ-5X questionnaire. The results show that: (i) transformational and transactional leadership styles are widely used; (ii) the existence of differences is not significant in leadership styles between men and women; and (iii) the composition of teams results in significant differences in leadership style. Transformational leadership is implemented in mixed teams with a male majority and a female leader, and more implemented in homogeneous teams (made up only of men or only women). Transactional leadership is best implemented in teams made up of all women. Barbuto, Fritz, Martin and Marx (2007), using the MLQ questionnaire, showed that the effect of the leader's age, in the subordinate's group of 46 years or older, was ranked as the highest in transformational leadership (including the idealized influence, intellectual stimulation, individualized consideration, and effectiveness subscales). The lowest ratings were given by the 36-45 age group, for intellectual stimulation and individualized consideration. The age of the leader had no significant effect on the evaluators' perceptions of the influence techniques used, as well as the age of the led.

- H4: Transformational Leadership is positively associated with the extra effort, effectiveness, and satisfaction.

- H5: Transactional Leadership is negatively associated with the extra effort, effectiveness, and satisfaction.

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- H6: Laissez-faire leadership is negatively associated with the extra effort, effectiveness, and satisfaction.

Purvanova and Bono (2009) show that the most effective leaders were those who revealed the transformational leadership style in virtual teams. With regard to satisfaction levels, Ruggieri (2009), in his study, demonstrates that the highest levels of satisfaction are related to a transformational leader interacting in virtual contexts. In general, it was found that virtual team members prefer the transformational leadership style to the transactional leadership style.

Collection, processing, and analysis of data

To achieve our objectives, we carried out a quantitative and cross-section study. Primary data were obtained to answer previously established research questions. Data collection was done through a questionnaire published online in order to obtain a greater number of responses. A non-probabilistic convenience sampling method was used (Malhotra, Nunan and Birks, 2017) . To identify and correct possible gaps, a questionnaire pilot test was carried out with seven IT employees. The final questionnaire was available on Google Forms platform, being shared with IT team leaders in a virtual context, who later circulated through their teams, between April and June of 2021. The data were analyzed using the SPSS statistical software, version 27.0. The target population of this study were individuals, aged 18 or over, belonging to IT teams of national and multinational organizations in Portugal.

Questionnaire

An adaptation of the MLQ 5X, Portuguese version of the questionnaire by Gonçalves (2008) was used. The MLQ 5X contains 45 items, which we can group into three leadership styles (transformational, transactional, laissez-faire) and three leadership outcomes: satisfaction (degree of satisfaction that the leadership style generates in the team, whether it generates a pleasant working environment and whether this is perceived as being adequate); effectiveness (the leader's degree of effectiveness regarding the needs of each element and in representing the team before higher hierarchical levels); and extra effort (the leader's ability to make each element do more than expected and to exceed expectations), the items are rated using a 5-point Likert scale.

Statistical techniques used

In this study, we used descriptive statistics to characterize our sample. To assess the internal consistency of items that constitutes the latent variables, the Cronbach's Alpha coefficient was used.

To test hypotheses H1 to H3, parametric hypothesis tests were used, namely the t-test when we want to test means of two independent samples and the one-way Analysis of Variance when testing means of three or more independent samples, and, nonparametric tests, namely the Kruskal-Wallis H test, were used to test whether there are significant differences between three or more independent groups and populations. In order to test hypotheses H4 to H6, multiple linear regression models were estimated. In all tests, the 5% significance level was used.

Analysis and discussion of result

Sample characterization

The study sample consists of 167 professionals from IT teams in national and multinational companies. Table 1 presents the sociodemographic characteristics of the subordinates.

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Table1: Sociodemographic characteristics of subordinates

Sociodemographic factors	Variables	Absolute Frequency	Percentage
Gender	Female	83	49.7%
	Male	84	50.3%
Academic qualifications	up to 12th grade	18	10.8%
	Bachelor's degree or equivalent	72	43.1%
	Master's and PhD	77	46.1%
Working in a virtual context before the pandemic	Yes	50	29.9%
	No	117	70.1%
Age	< 30	66	39.5%
	30 - 40	61	36.5%
	> 40	40	24.0%
Number of years of professional experience	< 5	41	24.6%
	6 - 10	61	36.5%
	11 - 15	21	12.6%
	16 - 20	16	9.6%
	> 20	28	16.8%
Number of years of IT professional experiencing in the virtual context	< 1	57	34.1%
	1 - 5	90	53.9%
	>= 6	20	12.0%
Number of years of work with the current manager	< 1	60	35.9%
	1 - 4	67	40.1%
	>=5	40	24.0%

Source: Authors´ own elaboration

The results of Table 1 show that our sample consists of 50.3% males and 49.7% females; 89.2% have higher education. The predominant age group is below 30 years old with 39.5%, followed by the 30 to 40 years old class with 36.5% and above 40 years old with 24%. In a work context adopted before the Covid-19 pandemic, it appears that 70.1% of individuals had not yet experienced this work model. The predominant class of professional experience is from 6 to 10 years of experience, with 36.5%; the class between 11 to 15 years of experience with 12.6%, 16 to 20 years of experience with 9.6% and over 20 years of experience with 16.8%. In the variable "number of years of IT professional experience in a virtual context", 34.1% of respondents have less than 1 year; 53.9% have between 1 and 5 years; and 12% have 6 or more years. For "number of years of work with the current manager", the class less than 1 year has 35.9 %; between 1 and 4 years with 40.1%; and with 5 years or more with 24% of respondents. Regarding team leaders in our sample, there is a predominance of males (70.1%); 39.5% are in age group between 30 and 40 years old, followed by the age group from 41 to 50 years old, with 37.1%, over 50 years old, with 16.8%.

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Internal consistency analysis

To assess the reliability of the MLQ subscales used in the study, an internal consistency analysis was performed using the Cronbach's Alpha coefficient. The results obtained are 0.965 for the transformational leadership, 0.843 for the transactional leadership, and 0.833 for the laissez-faire. So, it is possible to conclude that the variables present very good or good reliability (e.g., Hair et al, 2019). Regarding the items corresponding to the leadership results dimensions, they also present results above 0.80, indicating good reliability.

Hypotheses validation

To validate the hypotheses, H1, H2 and H3, parametric t tests, one-way analysis of variance and non-parametric tests were used. To validate the hypotheses, H4, H5 and H6, in which it is intended to determine which leadership style (transformational, transactional and laissez-faire) has the greatest positive impact on leadership results (effectiveness, extra effort and satisfaction) in a virtual context, we estimated multiple linear regression models between the independent variables (leadership styles) and the dependent variables (leadership results).

Table 2 presents the results obtained to test hypothesis H1. Considering a significance level of 5%, the data do not revel significant differences regarding the perception of leadership styles between male and female subordinates, (all p-values > 0.05). This validates H1, that the gender is not a differentiating factor in the perception of leaderships styles.

Table 2: T-tests for the gender of the subordinate

Leadership style	Gender	Mean	St. Deviation	t-stat	df	p-value
Transformational	Male Female	3.952 4.121	0.642 0.779	-1.523	165	0.130
Transactional	Male Female	3.497 3.300	0.673 0.840	1.675	156.7	0.096
Laissez-faire	Male Female	2.478 2.328	0.781	1.266	165	0.207

Source: Authors´ own elaboration

The analysis of variance, ANOVA, was used to test H2. Based on the results of table 3, we found that all the p-values are above the 5% significance level. In this way, it is possible to validate hypothesis H2, in which there are no differences in the average perception of leadership styles in the three age groups under study, which agrees with the studies by Barbuto, Fritz, Martin and Marx (2007).

Table 3: ANOVA for the subordinate's age

Leadership style	Age	Mean	St. Deviation	F	p-value
Transformational	< 30 30 – 40 > 40	4.018 4.088 3.986	0.087 0.085 0.129	0.273	0.761
Transactional	< 30 30 – 40 > 40	3.407 3.412 3:366	0.095 0.106 0.105	0.500	0.951
Laissez-faire	< 30 30 – 40 > 40	2.280 2.478 2.494	0.723 0.803 0.760	1.432	0.242

Source: Authors´ own elaboration

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The Kruskal-Wallis nonparametric test was used to test H3. The results in table 4 show that all the p-values are above the 5%, and so we can validate H3, that the number of years of experience of the subordinate does not influence the perception of transformational, transactional and laissez-faire leadership styles, which agrees with the studies of Müller and Turner (2007), Lee (2010) and Park and Popescu (2014).

Table 4: Kruskal-Wallis H test for subordinate's years of experience

Leadership style	years of professional experience	n	rank mean	H	df	p-value
Transformational	< 5	41	82.88	0.508	4	0.973
	6 - 10	61	83.66			
	11 - 15	21	89.79			
	16 - 20	16	86.53			
	> 20	28	80.61			
Transactional	< 5	41	84.76	1.412	4	0.842
	6 - 10	61	87.36			
	11 - 15	21	73.21			
	16 - 20	16	86.09			
	> 20	28	82.46			
Laissez-faire	< 5	41	76.22	3.229	4	0.520
	6 - 10	61	88.38			
	11 - 15	21	73.95			
	16 - 20	16	87.34			
	> 20	28	91.48			

Source: Authors´ own elaboration

To test H4, H5 and H6 hypothesis, we started by estimating multiple linear regression models for each of the dependent variables as a function of the three leadership styles. After analyzing the individual significance of each of the independent variables, the final models were estimated with only the statistically significant variables. Tables 5, 6 and 7 present the final models estimated for the dependent variable's extra effort, effectiveness and satisfaction, respectively. Analyzing the model presented in table 5, we can conclude that transformational leadership is directly related to extra effort. The estimated model explains 53.4% of the total variance of extra-effort and is statistically significant (Fobs = 189.443 and p-value =0.000).

Table 5. Estimated model for the dependent variable extra-effort

Model	Unstandardized Coefficients	Standardized Coefficients	t-stat	p-value
(Constant)	0.179		0.696	0.487
Transformational Leadership	0.862	0.731	13.764	0.000
R^2 = 0.534				

Source: Authors´ own elaboration

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Examining the estimated model presented in Table 6, we can conclude that transformational leadership has a direct association with effectiveness and is the leadership style that most contributes to effectiveness; in turn, the laissez-faire style has an inverse linear association with effectiveness. The estimated model explains 68.4% of the total variance of effectiveness and is statistically significant (Fobs = 177.746 and p-value =0.000).

Table 6: Estimated model for the dependent variable effectiveness

Model	Unstandardized Coefficients	Standardized Coefficients	t-stat	p-value	Tolerance	VIF
(Constant)	1,583		6,627	0.000		
Transformational Leadership	0.727	0.735	15,937	0.000	0.906	1.103
Laissez-faire	-0.202	-0.217	-4,711	0.000	0.906	1.103
R2 = 0.684						

Source: Authors´ own elaboration

Table 7 shows the estimated model for satisfaction and, we can conclude that transformational leadership has a positive association with satisfaction, and laissez-faire has a negative association with satisfaction. The estimated model explains 55.3% of the total variance of satisfaction and is statistically significant (Fobs = 101.534 and p-value =0.000).

Table 7: Estimated model for the dependent variable satisfaction

Model	Unstandardized Coefficients	Standardized Coefficients	t-stat	p-value	Tolerance	VIF
(Constant)	0.870		2,451	0.015		
Transformational Leadership	0.846	0.684	12,475	0.000	0.906	1.103
Laissez-faire	-0.174	-0.150	-2,739	0.007	0.906	1.103
R2 = 0.553						

Source: Authors´ own elaboration

From the results reported in Tables 6 and 7, it is possible to verify that the tolerance values are greater than 0.10 and the VIF (variance inflation factor) is less than 10 for all independent variables, so it can be concluded that there is no multicollinearity between the independent variables in the estimated regression models. Finally, table 8 shows the summary of the information developed in this section, with respect to the validation of the hypotheses.

Table 8: Hypothesis validation

H1	H2	H3	H4	H5	H6
Validated	Validated	Validated	Validated	Rejected	Partially validated

Source: Authors´ own elaboration

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Conclusion

In this research, we sought to deepen the effects that the different leadership styles (transformational, transactional and laissez-faire) perceived by the subordinates affect the results of leadership: extra effort, effectiveness and satisfaction.

According to the perception of the subordinates, the results support the ideal leadership mix of Avolio and Bass (2004). In other words, the transformational leadership dimension has the highest average values, followed by transactional leadership dimension and, finally, by the laissez-faire leadership dimension.

Regarding hypotheses H1, H2 and H3, it appears that there are no differences in the perception of transformational, transactional and laissez-faire leadership styles between subordinates in terms of gender, age and number of years of experience, which is in line with studies by Barbuto, Fritz, Martin, and Marx (2007) .

The statistical evidence from the analysis carried out proves that transformational leadership is the dimension with a significant positive impact on leadership results, namely, in extra effort, in effectiveness and satisfaction, in line with studies by Purvanova and Bono (2009), Ruggieri (2009), Gyanchandani (2017), Samanta and Lamprakis (2018), Keisu, Öhman and Enberg (2018).

Transactional leadership is not significant in leadership results, namely in extra effort, effectiveness and satisfaction, contrary to what was explained in the study by Ruggieri (2009), Ghaus, Lodhi and Shakir (2017), Samanta and Lamprakis (2018), Kindarto, Zhu and Gardner (2020) that suggest negative impacts. Quintana, Park and Cabrera (2015) and Heller and Conner, (2017) indicate the "contingent reward" of transactional leadership is one of the most important factors that positively affect the three outcomes.
Laissez-faire leadership is not significant in the extra effort, and has a negative impact on leadership results, namely on effectiveness and satisfaction. These results partially agree with the studies performed by Ghaus, Lodhi and Shakir (2017), Samantha and Lamprakis (2018).

It is possible to conclude that, according to the definition of transformational leadership by Bass and Avolio (2004) and the results presented in this research, regarding virtual teams in the IT sector, the highest average value of the leadership practice, transformational can mean a high level of maturity, ideals and concerns for the well-being of those being led by the leaders. It seems to allow us to affirm that leaders are successful in emphasizing the collective values and needs of the group, in favor of the needs of individual members, being a leadership style that involves and influences subordinates to accomplish more than what is normally expected of them, also enabling group members to achieve more than they could on their own (Conger, 1999; Judge et al., 2004; Bass and Bass, 2008; Avolio et al., 2009; Vito, Higgins and Denney, 2014). It is extrapolated that there are significant correlations between leadership styles and leadership results, namely between transformational styles with extra effort, effectiveness and satisfaction and the laissez-faire style with effectiveness and satisfaction, and transactional leadership is not significant. Furthermore, it should be noted that transformational leadership is positively related and laissez-faire leadership is inversely related to leadership outcomes.

Considering the conclusions drawn, it may be essential to identify the reasons for the perceptions of the followers regarding laissez-faire leadership, which has negative impacts on the results, verifying the need to create strategies to reverse the situation, namely through the adoption of transformational leadership behaviors. These negative effects of this style of leadership may have consequences at the organization level, such as a decrease in the efficiency of the subordinates and motivation, which may harm the organization, compromising the alignment with the corporate culture, strategy, and may be reflected in the responsible freedom

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granted to the subordinates when it comes to remote work.

From the results obtained, it is expected that this study will contribute to deepening scientific knowledge about the impact of different leadership styles that most impact results in terms of extra effort, effectiveness and employee satisfaction.

Taking into account the organizational impact of the recent COVID-19 pandemic, it is intended to contribute to the expansion of knowledge about virtual leadership, as well as contributing to a greater awareness about the importance of leadership in a virtual context, leading to the updating and adaptation of knowledge and practices of leaders.

The limitations of this study go through the fact that data collection was carried out through an online survey, directed only to IT companies. In addition, the long length of the questionnaire may have caused some people to stop before the end and not send the answers.

Future research could focus on the psychographic characteristics of subordinates, given the impact of the COVID-19 pandemic and its repercussions. This will possibly help companies to better target the way they lead employees, meeting better leadership results, namely, extra effort, effectiveness and satisfaction, and to investigate the differences between the perceptions of the followers and the leaders of the same work group, understanding how the leader perceives his leadership style and how the respective followers perceive the leadership practiced by the leader, that is, to understand in what measure there is a correspondence between the subordinates' and the leader's perceptions.

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