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Leadership and Performance of the Software Development Team: Influence of the Type of Project Management

Fernando Andre Zemuner Garcia[1]
Rosária de Fatima Segger Macri Russo[1]
[1]*UNINOVE –University Nove de Julho, Postgraduate Program in Project Management, São Paulo, Brasil*

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Abstract

Purpose – The objective of this article is to identify the influence of the type of leadership on the performance of the project team, according to the methods applied in the management of software development projects.

Design/methodology/approach – We used a quantitative method, applying a survey to project practitioners in software development teams. The sample consisted of 245 valid answers, divided into traditional and non-traditional methods. The responses were analyzed through structural equation modeling using a confirmatory methodological approach.

Findings – We identified that the three styles of leadership evaluated (transactional, transformational, and empowering) are positively related to team performance, as already identified in previous studies. However, the project management method does not influence the relationship between leadership and team performance.

Originality/value – The theoretical and practical contribution of this article is the finding that the type of project management used in software development (agile or traditional method) is not relevant to the choice of team leader, emphasizing that the important thing is the investment in the development of this leadership, as a measure to increase team performance, allowing flexibility in the performance of managers.

Keywords – Project Management, Leadership Styles, Team Performance, Structural Equation Modeling, Agile Methods

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1 Introduction

Despite the existence of guides to good practice and established methodologies, many projects still show a high degree of failure (Lalonde, Bourgault, & Findeli, 2012). According to Papadopoulos (2015), traditional software development methods are inflexible and fail to respond to consumer and business needs, and other methods, such as agile, provide a set of practices that enable rapid adaptations to the needs of modern product development.

A few articles, such as Papadopoulos (2015) and Ben Mahmoud-Jouini et al. (2016), have evaluated organizations that adopt more than one methodology for the development of their products and services. However, these articles did not compare traditional and non-traditional methodologies to verify the differences and similarities in the results. Serrador and Pinto (2015) demonstrated a weak superiority of the agile method over traditional methods in project success.

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In 2013, the Gartner Group created the term bimodal Information Technology (IT) to describe the adoption of two project management methodologies within the same organization, to allow for the choice of the most appropriate method for its projects (Aron & McDonald, 2014). Although the term is new, the concept and its adoption by organizations already existed (Horlach, Drews, & Schirmer, 2016). In this situation, organizations need to simultaneously handle two design environments, in which two important factors are the profile of people and leadership and the organizational structure. Mode one develops projects in a well-defined organizational structure and processes, while mode two needs a culture focused on innovation, which allows agility to deal with uncertainty and changes, with support from users and senior management (Gartner, 2015). According to Anguelov and Angelova (2016), mode one is based on the leadership style of command and control, while mode two has a participatory structure of team members. The leader in mode two becomes a facilitator and mediator, instead of being a controller. Also according to these authors, in mode two, the team is no longer composed mostly of specialists and is instead composed of a multidisciplinary team. It is therefore relevant to evaluate the performance of the team in this double environment with different needs and characteristics. Due to team or leadership performance factors, and the need to adapt to management models, projects fail in certain criteria and succeed in others (Patah & Carvalho, 2012).

There are various styles of leadership (Fleishman et al., 1991), but in this study we evaluate transactional, transformational, and empowering leadership (Pearce & Sims Jr, 2002). According to these authors, transactional leadership is based on goals and rewards for team engagement, and hopes to achieve goals by improving team performance. Transformational leadership expects to achieve high performance through a charismatic and transformative leader of the team and its performance. Empowering leadership encourages individual thinking, self-development, and leadership sharing to achieve the desired performance of the team.

One of the most addressed topics in team performance research is the impact of leadership, seen in the articles by Peltokorpi and Hasu (2015), Boies, Fiset, and Gill (2015however, are not well understood. To identify the intervening processes inherent in this relationship, we experimentally manipulated the leadership style assigned to 44

teams taking part in a resource-maximization task. Teams were exposed either to a leader using inspirational motivation, intellectual stimulation, or a control condition. Our findings reveal important differences between leadership styles in communication and team outcomes (objective task performance and creativity), Sousa and Van Dierendonck (2016), Neil, Wagstaff, Weller, and Lewis (2016), Liu et al. (2015), Zhang, Cao, and Tjosvold (2011), and Hoch and Kozlowski (2014). All of these studies concluded that team performance is directly linked to leadership, especially transformational leadership, but none of them evaluated the difference in this performance in projects with distinct management methods, that is, traditional and agile.

An organization that has projects in modes one and two may require its managers to act in projects in both modes. As the requirements are different, and not only technical, the question arises regarding whether one leadership style would be more efficient in some of the environments. Thus, the main objective of this article is to identify the influence of the type of leadership on the performance of the project team, according to the methods applied in the management of software development projects. There are also the following secondary objectives:

- Identify the influence of the type of leadership, whether transactional, transformational, or empowering, on the performance of the project team.
- Identify the influence of the project methodology on the relationship between the leadership and the performance of the project team.

In the next item, the concepts of team performance, leadership styles, and project management methods are defined, because they support the empirical research carried out by Pearce and Sims Jr (2002), detailed in item 3, together with the methodological procedures we adopt. Item 4 describes the results and then we present the conclusions.

2 Theoretical Framework

In the next items, team performance and leadership and their styles will be discussed to support the analysis performed in this article, as well as project management methods. During this discussion we present the research hypotheses.

2.1 Team performance

Team performance is a theme that has been studied by many researchers for a long time, relating to several factors. For example, Ancona and Caldwell (1992) evaluated the impact of the diversity of composition of team members. Boies, Fiset, and Gill (2015however, are not well understood. To identify the intervening processes inherent in this relationship, we experimentally manipulated the leadership style assigned to 44 teams taking part in a resource-maximization task. Teams were exposed either to a leader using inspirational motivation, intellectual stimulation, or a control condition. Our findings reveal important differences between leadership styles in communication and team outcomes (objective task performance and creativity) verified that communication and trust are essential for leadership, specifically for the transformational style. Sousa and Van Dierendonck (2016) identified leadership shared by the leader as having a strong influence on team integration, increasing team performance due to the sharing of information. Neil, Wagstaff, Weller, and Lewis (2016) studied the transformational leadership style, indicating that the way the team works to achieve important goals and the use of the emotional intelligence of team members have a direct impact on performance.

Another factor also evaluated is how the team is managed. If the team has conflict-of-activity management, team performance will be positively impacted (De Dreu & Weingart, 2002). Team performance can be assessed from two main perspectives: effectiveness and efficiency. These perspectives have the following three points of view: result of the work from the client's point of

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view, from the point of view of the organization, and from the point of view of the team (Hoegl & Gemuenden, 2001)that \"good teamwork\" increases the success of in- novative projects, raises new questions: What is teamwork, and how can it be measured? Why and how is teamwork related to the success of innovative projects? How strong is the relation- ship between teamwork and various measures of project success such as performance or team member satisfaction? This article develops a comprehensive concept of the collaboration in teams, called Teamwork Quality (TWQ. In this study, we analyze effectiveness in the performance of the team, using seven different dimensions (Pearce & Sims Jr, 2002): output, quality, changes, organization and planning, interpersonal, value, and overall.

According to Pearce and Sims (2002), the output dimension takes the form of team deliveries, with a consistent and effective workload, and important changes; while the quality dimension comprises the production of high quality, accuracy, and consistency in the execution of the activities and elimination of definitive problems by the team. The changes dimension emerges through tackling new problems effectively, with behavioral changes to meet the changes either in the organization or in the project, as well as the ability to cope well with changes. The organization and planning dimension takes the form of goals and priorities, with the development of viable plans, operations in major problems, and clear priorities (Pearce & Sims Jr, 2002). According to these authors, the interpersonal dimension comprises the communication of progress, with the possibility of doing so proactively, keeping everyone informed about the complete situation of the project; while the value dimension emerges through the contribution of the team to the organization, making contributions that add value to the organization. The overall dimension takes the form of high efficiency and excellent progress of the team, with good performance and good work.

2.2Leadership

One role of extreme importance within teams is that of the leader, because according to Grant, Graham, and Heberling (2001), he/she should act as the team leader, orchestrating the members to get the best performance. Grant et al. (2001) emphasize that the leader must act as a champion, with total dedication to the project, but giving specific support to team members when demanded. The role of the leader has a significant impact on project teams and the involvement of the organization, which ultimately affects the team and its performance (Thamhain, 2007). The project leader must manage people's work and relationships through organizational and cultural differences, including giving functional support to suppliers, sponsors, and partners (Thamhain, 2007).

The study of the Leadership theme is not new. The authors identified 65 possible classifications of systems of behavior of the leader between 1944 and 1986 (Fleishman et al., 1991). In this study, the authors conclude that the behaviors of the leader can be divided into two large groups, those with a focus on completing tasks and others with a focus on people, with these groups appearing in both the literature on leadership and in the literature on teams and leadership in teams. Burke et al. (2006) use transactional leadership, initial structure, and broadening the boundaries for the group with a focus on completing the tasks; while for the people-focused group, transformational leadership, consideration, empowerment, and motivation is used.

Empowering leadership is a newer theory in which leadership is shared among all team members (Pearce & Sims Jr, 2002). Transactional leadership seeks to engage team members through personal or material rewards that make members always seek to do more to achieve those rewards (Bass, 1990). This author described four types of transactional leaders: reward, active and passive exception, and laissez-faire. Several studies have reported the impact of transactional leadership on team performance as a positive relationship (Vecchio, Justin, & Pearce, 2008; Kwon &

Jang, 2012; Birtch, Chiang, & Van Esch, 2015). Thus, these conclusions are combined with the hypothesis by Pearce and Sims Jr (2002), generating the following hypothesis:

> **H1**: *Transactional leadership is positively related to team performance.*

Transformational leadership is based on four theoretical bases: sociology of charisma, charismatic leadership, transforming leadership, and transformational leadership. Bass (1990) states that this type of leader seeks to engage team members using their charisma and their power to transform the team, getting the team to follow them through their power to influence it. For these authors, transformational leaders are charismatic, inspiring, and use intellectual simulation and individual consideration. This type of leadership has been identified as positively related to team performance (Dionne et al., 2004; Keller, 2006; Sun et al., 2014). Based on these authors and on the hypothesis by Pearce and Sims Jr (2002), we define the following hypothesis:Hypothesis 2 (H2): Transformational leadership is positively related to team performance.

Empowering leadership, according to Pearce and Sims Jr (2002), has four theoretical bases: behavioral self-management, social cognitive theory, cognitive behavior modification, and participatory goal setting. Studies on this style go in two directions. The first focuses on the leader, with the division of power or providing greater responsibility and autonomy to those being led; and the second focuses on the empowerment of those being led, directing the studies to their motivations (Srivastava, Bartol, & Locke, 2006; Biemann, Kearney, & Marggraf, 2015). This style seeks to engage team members, encouraging them at all times to become self-reliant and stimulating their development. Based on the hypothesis by Pearce and Sims Jr (2002), the following hypothesis emerges:

> **H3**: *Empowering leadership is positively related to team performance.*

During the analyses, we identified that transactional leadership, transformational leadership, and empowering leadership did not present discriminant validity in the measurement model, indicating multicollinearity among the analyzed leaderships. Due to this fact, as according to Menezes, Guimarães, and Bido (2011)proposto por Marsick e Watkins (2003, the analysis can be carried out by grouping the variables (leaderships studied) into a new one, which was called Leadership. With reference to the above assumptions, the need that arose during the review period, and the papers by Thamhain (2007) and Grant, Graham, and Heberling (2001), a new hypothesis was created:

> **H4:** *Leadership is positively related to team performance.*

2.3Methods and frameworks in project management

The construct of methods and frameworks in project management is divided into two macro topics: traditional methods and non-traditional methods of project management, such as agile methods (Serrador & Pinto, 2015). Due to this division into two large groups, we will use the multi-group analysis model of the structural equations model as a moderator variable, as according to case 2 by Baron and Kenny (1986), who studied a dichotomous moderating variable and a continuous independent variable, and this will be of the intervening type because it does not present a correlation between the dependent variables and the moderator, nor a correlation between the moderating variable and the independent variable, as according to the definitions reinforced by Vieira (2009) in his article.

2.3.1 *Traditional Methods*

Project management started a long time ago. In the 1970s, Royce (1970) proposed the Waterfall model in his article, which is adopted in many organizations to this day. According

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to Serrador and Pinto (2015), the traditional methodology follows a cascade development cycle, so that the product is specified at the beginning of the project and will be checked only at the end. With the evolution of project management based on the Waterfall model, it was necessary to organize the best practices of project management. With this, some entities have emerged and published guidelines of good practices in project management. Examples of methods based on the traditional project management model are the method based on best practices (PMI, 2013), the method based on PRINCE2, and the method based on IPMA.

2.3.2 *Non-Traditional Methods and Frameworks*

The agile methodology was created in the 1990s, officially beginning in the declaration of the agile manifesto of 2001 by Schwaber and Sutherland (2013) and 17 other software development leaders. As suggested by Sauer and Reich (2009), the agile method of project management is a new way of thinking about project management. This methodology allows for greater integration among project participants, since all are responsible for the result, unlike the traditional method, in which the project manager is chiefly responsible (Serrador & Pinto, 2015). By presenting smaller cycles, it allows a greater adaptability of the products to be delivered and, as a consequence, faster changes. The agile Scrum framework stands out in the market, and eXtreme Programming or simply XP and Lean stand out as agile development techniques (Gren, Torkar, & Feldt, 2015). Thus, non-traditional methods, such as agile, assume that there is greater interactivity among team members and faster patterns, in smaller parts and with many changes throughout the process.

2.3.3 *Influence of methods on the relationship between leadership and performance*

Based on the premise that in traditional project management, the transactional leader must control the activities, making team performance positively related to these leadership styles (Keller, 2006), it is assumed that the impact of non-traditional management will be negative on transactional leadership which provides for rewards to staff. This is because the more and more the organization adopts this type of management it encourages self-development and there is no longer the exchange of favors or the identification of the team members with the organization for years (Hoffman, Casnocha, & Yeh, 2013), besides not being the most suitable leadership style for agile teams (Kelle, Visser, Plaat, & Wijst, 2015).

> **H1a**: *The project management method moderates the relationship between transactional leadership and team performance.*

In the management of traditional projects the transformational leader has the power to influence the team, so that its performance is positively related to this style of leadership (Keller, 2006). In non-traditional project management, a charismatic leadership encourages team development and improvements in deliveries to the organization (Hoffman et al., 2013).

> **H2a:** *The project management method moderates the relationship between transformational leadership and team performance.*

Empowering leadership requires greater sharing of leadership. In traditional project management it can have an inverse effect, because in this method of project management the leader is the one with the decision-making power, and does not have to share their leadership with the team. With this, leadership sharing is low, making this style of leadership negatively related to team performance (Tessem, 2014). The opposite can occur in non-traditional project management, in which the empowering leader uses adaptive and charismatic leadership and team member engagement, involving leadership sharing with an

emphasis on people and interactions, and greater decision-making power (Kelle et al., 2015). This can make this leadership style positively related to team performance. Thus, we generated the following hypothesis:

> **H3a:** *The project management method moderates the relationship between empowering leadership and team performance.*

Similarly, the hypothesis created during the analysis period for the Leadership variable generated a new hypothesis derived from the moderation of project management, and according to the original hypotheses of moderation of project management in the styles of leadership analyzed, we have the new hypothesis:

> **H4a:** *The project management method moderates the relationship between leadership and team performance.*

3 Methodological Procedures

To meet the goal of identifying the influence of the type of leadership on the performance of the project team, according to the methods applied in the management of software development projects, a positivist approach was used through the hypothetico-deductive research method (Creswell, 2012), by means of a survey. Thus, this is a study that empirically tests the concept of the relationship between team performance and leadership based on the hypotheses adopted in this research. It involves quantitative research of a confirmatory nature, and is methodological, considering the software development team as the unit of analysis and using a statistical power of the sample of 0.95.

3.1 Operational Model

Based on the theoretical framework and the original hypotheses developed before beginning the analyses, we proposed the research model in Figure 1 for this article. The project management methods are the moderating variables of the model, through which we addressed traditional and non-traditional methods. The independent variables of the proposed model are the transactional, transformational, and empowering styles of leadership and team performance is the dependent variable of the model.

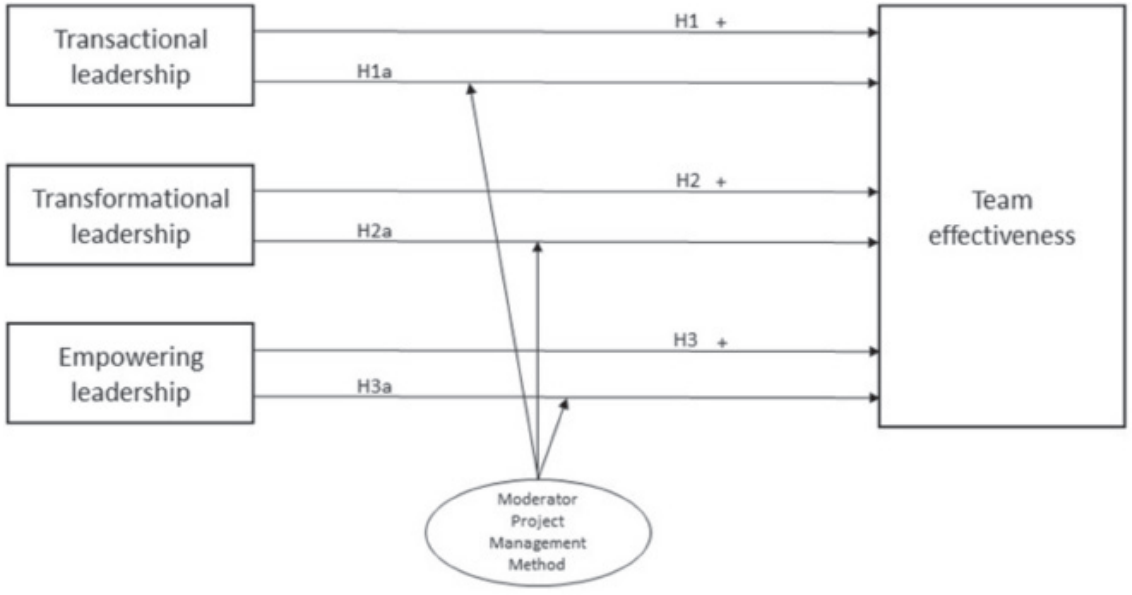

Figure 1. Original Research Model

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According to Hair et al. (2009), scales are used as a resource to identify the measure of variation in a set of variables or between a dependent variable and an independent variable. For the definition of variables, we used the model by Pearce and Sims Jr (2002), as well as their measurement scales. The items were translated and retranslated in the process known as reverse translation. Once a consensus on the material was reached, we performed a new test. The material was sent to a US professional and a Brazilian one for validation, who were not involved in the translation and retranslation process, allowing for the necessary grammatical adjustments in the two languages.

3.2 Instrument and data collection

For the collection of data, we created an electronic questionnaire, via Google Forms and in surveymonkey.com. After this, we performed a pre-test, in which a project leader and a team member were asked to answer the questionnaire. After minor modifications, the questionnaire, which can be seen in Appendix A, was distributed to the authors' contacts via Linkedin, personal email, professional email, and Whatsapp groups that had some relationship with IT. An email was also sent to the students and alumni of the master's degree in business administration - project management (UNINOVE – *Universidade Nove de Julho*). In the email there was an introduction, indicating that the respondent should act in the management of software development projects. We also requested a referral to some contact who has worked or works in this area. The distribution involved approximately 1,400 different people who had the desired profile to respond to the questionnaire, obtaining 316 answers, 245 of which were valid for the analysis, divided into traditional and non-traditional methods.

3.3 Data analysis

We performed the data analysis in two steps. The first step was done in Excel, by merging the answers from the Google Forms database and surveymonkey.com. In this first step, 71 invalid responses of respondents who did not act in software development projects or with incomplete data were discarded.

In the second step, we verified the normality of the sample, according to Hair et al. (2009), which was not confirmed. In this case, Ringle, Da Silva, and Bido (2014) suggest the use of structural equation modeling (SEM) or partial least squares (PLS), so we decided to use PLS-SEM to analyze the data, using the SmartPLS software version 3.

The analysis of the model was divided into two main groups: evaluation of the measurement model and evaluation of the structural model. We performed the moderation analysis only in the steps of the structural model evaluation group, after having the measurement model defined. According to Wong (2016), we had to use the multi-group functionality, due to the fact that the moderator affects all the proposed model. The model is of the reflective-formative type, due to the fact that the latent variables (LV) reflect the values of the observable variables (OV) and independent LVs form the dependent LV (Hair Jr., Hult, Ringle, & Sarstedt, 2014). Due to the complexity presented by the model, we used a hierarchical component model (HCM), which presents an additional level of abstraction, using second order constructs that have an established relationship (Hair Jr. et al., 2014).

In the evaluation of the measurement model, the first step is to assess the convergent validity, which includes the composition of the reliability of the internal consistency assessment, the individual reliability indicators, and the average variance extracted (AVE) (Hair Jr. et al., 2014). Afterwards, we evaluated the discriminant validity (DV). The DV can be understood as the indicator of the constructs or the LVs being independent of each other, according to Hair et al. (2014). Finally, the internal consistency of the model was evaluated, in which two indicators were used, Cronbach's alpha (CA) and composite reliability (CR), with the aim of ensuring that the

sample is bias free, as well as determining whether the analysis of the answers together presents reliable results (Hair Jr. et al., 2014).

In the analysis stage of the structural model, we verified how much the data represent the theory, as well as the relationship between the data, demonstrating the predictive capacity of the model and the relationships between the constructs (Hair Jr. et al., 2014). The first step is to analyze the Pearson's coefficient of determination or R^2, which aims to demonstrate the percentage of variation of the dependent variable in relation to the independent variable (Hair Jr. et al., 2014). When the R^2 is greater than 0.26, it can be considered that the effect of the ratio is large. The second step in the analysis is the t-test (significance test), which seeks to verify whether the existing regressions and correlations within the model are significant, calculated based on the original values and using bootstrapping (Ringle, Wende, & Becker, 2015). When this test has a value above 1.96, with $p < 0.05$, this shows high significance of the correlations.

Next, we analyzed the path coefficient, which serves to test if the existing relationship between two constructs is relevant or significant. In the penultimate stage, the f^2 or effect size Cohen indicator was analyzed, which is obtained by including and removing each of the constructs from the model, indicating the real utility of each construct for the construction of the fit of the evaluated model (Ringle et al., 2015). When the value of this test is higher than 0.35, it shows that the construct was very useful for the model's fit. The last step in the analysis involves the Q^2 predictive validity or Stone-Geisser indicator, which evaluates the accuracy of the adjusted model, and has to have a value greater than zero, with the perfect model having a value equal to one (Hair Jr. et al., 2014).

4 Analysis, Interpretation, and Discussion of Results

The survey respondents were classified according to their participation in the project team: leader (56%) and team member (44%). However, the focus of the analysis in this article is on the type of project management adopted by the respondent, and so the respondents were equally divided into traditional and non-traditional methods.

In performing the validations and checking the consistencies of the model, whose values can be seen in Appendix B, the variables Expectation of commitment, Erase fires, and Points only errors and no hits, had convergent validity (CV) of the 1st order OVs. In the discriminant validity (DV) analysis of the 1st order LVs, we find that PE-Global presents a greater load than PE-Deliveries in its construct, having no discriminant validity. However, due to the fact that 1st order LVs are indicators of the same 2nd order LV, we chose to combine all OVs in a 1st order LV called Team Performance, maintaining the same model structure as that of Pearce and Sims Jr (2002), instead of eliminating one more OV.

Next, we verified the composite reliability (CR), in which all LVs were within the appropriate range, between 0.70 and 0.90, while the AC of the LV Performance Expectancy was below the appropriate values, which should be above 0.60. However, because this is a study based on a validated model, we chose not to exclude the variable, since it could not be compared with the previous study (DeVellis, 2003). Moreover, since the 1st order LV had only 3 OVs, and one of them had already been eliminated, the 2nd order LV would have higher loadings than the other 1st order LVs of this LV.

Subsequently, the cross loadings method was evaluated, in which all the variables were within the standard, and therefore the measurement model presented discriminant validity.

Analyzing the values of the 2nd order LVs, we can verify that of the Transactional Leadership LV was less than 0.50, and so we checked the model by Pearce and Sims Jr (2002), in which the 1st order LV LTS-Management by Passive Exception was excluded, since this LV had no correlation with the others of the construct.

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From analyzing the DV of the 2nd order LVs, we can verify that the measurement model does not have discriminant validity, because the Transformational Leadership LV has a greater loading than the Empowering Leadership and Transactional Leadership LVs, indicating multicollinearity between the LVs. Due to this fact, as according to Menezes, Guimarães, and Bido (2011)proposto por Marsick e Watkins (2003, the analysis can be done by grouping the 2nd order LVs, creating a 3rd order LV. The 3rd order LV was called Leadership.

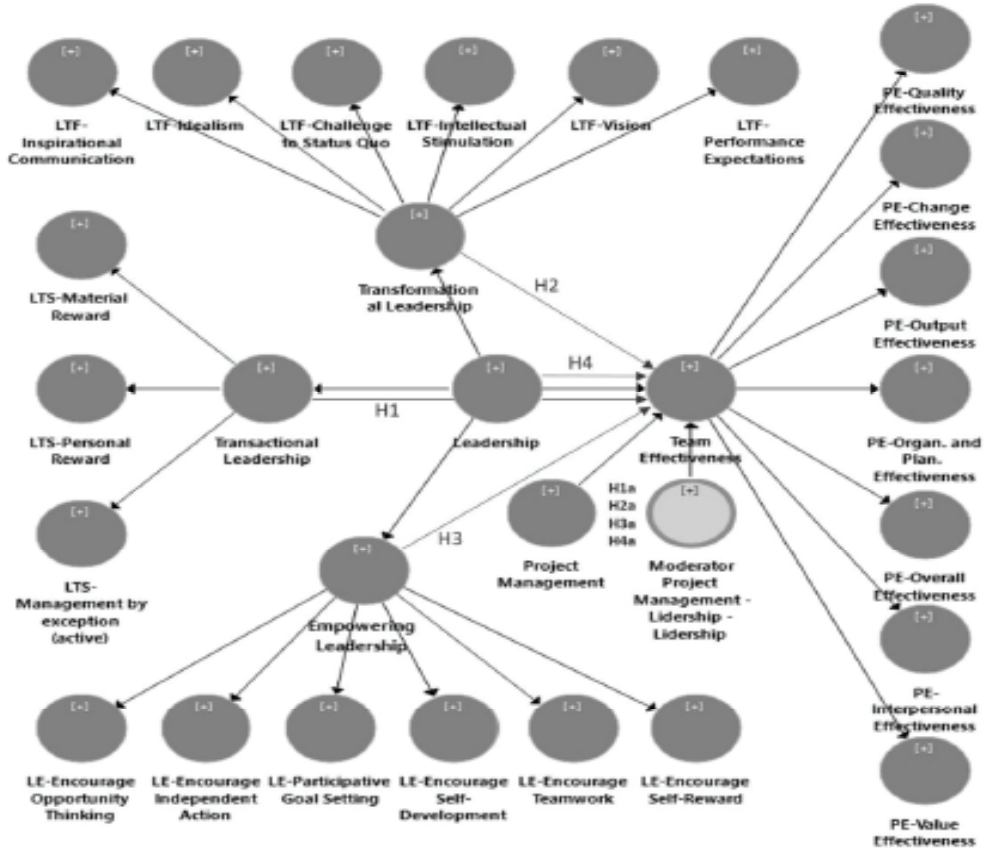

Figure 2. Final measurement model

Source: The Authors

Analyzing the values of the 3rd order LVs, we can verify that the AVE of the Leadership LV is higher than 0.50; however, that of the Team Performance LV was below 0.50. Due to this fact, we excluded OVs with a lower external weight, obtaining CV, DV, and internal consistency, with the final measurement model in Figure 2, which includes the moderating variable.

In the second stage of the evaluation, we evaluated the structural model, both of the complete model, and the models by type of management, as can be observed in Table 1. Due to the fact that the R^2 has values above 0.26 for the variables, all were accepted, with the exception of the **LTS – Active Exception Management** LV, which presented a value of 0.19 for the **traditional** moderator; that is, the first order LVs have a great relationship with the 2nd order LVs and the 3rd order LV with the independent variables. Consequently, we can say that 30% of the variance of the team's performance is explained by the Leadership in the total sample.

Table 1.
Analysis of the structural model 1st order LV

Variables	AVE			Composite Reliability			R^2			Cronbach Alpha			Q^2			f^2			t Statistic			Coefficient of Path		
	C	T	NT	C	T	NT	C	T	NT	C	T	NT	C	T	NT	C	T	NT	C	T	NT	C	T	NT
LE-Encourage Self-Reward	0,741	0,728	0,755	0,896	0,889	0,902	0,752	0,740	0,773	0,826	0,813	0,838	0,532	0,514	0,554	0,445	0,424	0,466	49,631	32,335	49,631	0,867	0,860	0,879
LE-Encourage Sef-Development	0,725	0,725	0,720	0,941	0,940	0,939	0,834	0,827	0,835	0,924	0,924	0,922	0,570	0,562	0,566	0,588	0,585	0,551	83,197	56,936	83,197	0,913	0,910	0,914
LE-Encourage Independent Action	0,591	0,536	0,638	0,852	0,818	0,875	0,658	0,595	0,706	0,770	0,709	0,806	0,364	0,292	0,416	**0,328**	**0,253**	0,390	31,713	18,182	31,713	0,811	0,771	0,840
LE-Participative Goal Setting	0,866	0,866	0,861	0,951	0,951	0,949	0,544	0,564	0,508	0,922	0,923	0,919	0,449	0,467	0,413	0,636	0,639	0,630	14,645	15,892	14,645	0,738	0,751	0,713
LE-Encourage Opportunity Thinking	0,761	0,727	0,793	0,905	0,889	0,920	0,702	0,685	0,732	0,843	0,812	0,870	0,513	0,473	0,552	0,477	0,424	0,528	36,902	26,632	36,902	0,838	0,827	0,856
LE-Encourage Teamwork	0,761	0,732	0,794	0,905	0,891	0,920	0,532	0,509	0,548	0,842	0,817	0,870	0,387	0,357	0,413	0,477	0,435	0,525	18,255	11,617	18,255	0,729	0,714	0,741
LTF-Inspirational Communication	0,727	0,714	0,735	0,888	0,882	0,893	0,813	0,819	0,805	0,811	0,799	0,820	0,567	0,562	0,562	0,425	0,405	0,432	6,295	3,577	6,295	0,902	0,905	0,897
LTF-Challenge to Status Quo	0,767	0,740	0,786	0,908	0,895	0,917	0,721	0,723	0,712	0,848	0,824	0,864	0,529	0,509	0,535	0,488	0,448	0,514	49,492	51,108	49,492	0,849	0,850	0,844
LTF-Intellectual Stimulation	0,659	0,608	0,709	0,906	0,886	0,924	0,832	0,796	0,864	0,870	0,839	0,896	0,519	0,454	0,583	0,471	0,401	0,510	53,524	45,868	53,524	0,912	0,892	0,929
LTF-Performance Expectations	0,663	0,631	0,696	0,797	0,773	0,821	0,337	0,283	0,382	**0,496**	**0,416**	0,568	0,215	0,157	0,254	0,086	0,019	0,152	72,317	50,166	72,317	0,581	0,532	0,618
LTF-Idealism	0,759	0,737	0,779	0,904	0,893	0,913	0,745	0,710	0,772	0,841	0,822	0,858	0,540	0,497	0,577	0,477	0,444	0,507	43,750	35,829	43,750	0,863	0,843	0,879
LTF-Vision	0,787	0,743	0,824	0,917	0,897	0,934	0,714	0,679	0,736	0,865	0,827	0,893	0,538	0,482	0,575	0,519	0,450	0,570	80,416	47,086	80,416	0,845	0,824	0,858
LTS-Management by Expectation (active)	0,542	0,525	0,553	0,825	0,808	0,830	0,279	**0,190**	0,379	0,727	0,697	0,751	0,133	0,083	0,173	0,259	0,249	0,281	10,610	6,226	10,610	0,528	0,436	0,615
LTS-Material Reward	0,862	0,877	0,840	0,949	0,955	0,940	0,809	0,849	0,761	0,920	0,930	0,905	0,667	0,712	0,610	0,632	0,653	0,599	42,014	29,383	42,014	0,899	0,922	0,872
LTS-Personal Reward	0,704	0,660	0,746	0,877	0,853	0,898	0,815	0,826	0,809	0,790	0,745	0,830	0,546	0,507	0,575	0,388	**0,319**	0,455	31,757	18,000	31,757	0,903	0,909	0,899
PE-Output Effectiveness	0,614	0,614	0,617	0,827	0,826	0,828	0,766	0,758	0,784	0,684	0,684	0,688	0,452	0,442	0,456	0,255	0,250	0,258	47,835	39,456	47,835	0,875	0,870	0,885
PE-Overall Effectiveness	0,716	0,702	0,731	0,910	0,904	0,916	0,827	0,826	0,834	0,867	0,857	0,877	0,563	0,547	0,580	0,498	0,481	0,519	76,311	54,049	76,311	0,910	0,909	0,913
PE-Interpersonal Effectiveness	0,750	0,770	0,712	0,923	0,930	0,908	0,633	0,704	0,523	0,888	0,900	0,864	0,450	0,511	0,354	0,544	0,575	0,495	27,563	27,043	27,563	0,795	0,839	0,723
PE-Change Effectiveness	1,000	1,000	1,000	1,000	1,000	1,000	0,458	0,466	0,440	1,000	1,000	1,000	0,449	0,450	0,418	1,000	1,000	1,000	17,731	12,837	17,731	0,677	0,683	0,663
PE-Org. and Plan. Effectiveness	0,767	0,815	0,711	0,868	0,898	0,831	0,623	0,677	0,551	0,696	0,773	0,596	0,461	0,532	0,371	**0,281**	0,376	**0,177**	32,226	36,116	32,226	0,790	0,823	0,742
PE-Quality Effectiveness	0,670	0,670	0,663	0,859	0,859	0,855	0,770	0,765	0,772	0,754	0,754	0,745	0,495	0,489	0,489	0,338	0,341	0,326	51,386	35,372	51,386	0,878	0,875	0,879
PE-Value Effectiveness	0,864	0,892	0,820	0,927	0,943	0,901	0,559	0,542	0,577	0,843	0,880	0,781	0,462	0,458	0,448	0,467	0,520	0,383	22,002	13,778	22,002	0,748	0,736	0,759

Note: Column C refers to the analysis of the structural model with the total sample, the T column refers to the Traditional Management sample, and NT refers to the Non-Traditional Management sample.
Source: The Authors

As we can see in Table 2, for the moderator with Traditional Management, due to the fact that the R^2 has the value of 0.32 for team performance, there is a very large effect of the relationship between the independent variables and the dependent variable, so that 32% of the variance of team performance is explained by Leadership. The R^2 of the 2nd order LVs of leadership show a great effect on the Leadership LV. The t-test shows high significance of the correlations and relationships between all leadership LVs and leadership and team performance.

Table 2.
Analysis of the structural model 2nd and 3rd order LVs

Variables	R^2			Q^2			f^2			t Statistic			Coefficient of Path			Hypothesis			
	C	T	NT	C	T	NT	C	T	NT	C	T	NT	C	T	NT	HC	Y	HM	Y
Leadership -> Transactional Leadership	0,810	0,799	0,818	0,331	0,314	0,341	0,334	0,316	0,337	71,811	28,408	53,657	0,900	0,894	0,904	H1	Y	H1a	N
Leadership -> Transformational Leadership	0,938	0,939	0,936	0,464	0,425	0,495	0,454	0,408	0,461	251,142	172,340	172,016	0,969	0,969	0,967	H2	Y	H2a	N
Leadership -> Empowering Leadership	0,961	0,964	0,955	0,453	0,431	0,467	0,437	0,413	0,426	346,749	260,042	243,713	0,980	0,982	0,978	H3	Y	H3a	N
Leadership -> Team Effectiveness	0,305	0,319	0,285	0,140	0,151	0,121	0,433	0,448	0,388	10,881	7,444	7,931	0,560	0,565	0,552	H4	Y	H4a	N

Note: Column C refers to the analysis of the structural model with the total sample, the T column refers to the Traditional Management sample, NT refers to the Non-Traditional Management sample, HC is the complete sample hypothesis, Y indicates whether the hypothesis was supported (Y) or not supported (N), and HM is the hypothesis with a moderator variable.

Source: Authors

For the moderator with Non-Traditional Management, due to the fact that the R^2 has the value of 0.29 for Team Performance, we also find a very large effect of the relationship between the independent variables and the dependent variable, so that 29% of the variance of team performance is explained by Leadership. The R^2 of the 2nd order LVs of leadership shows a large effect on the Leadership LV.

The t-test shows high significance of the correlations and relationships between all leadership LVs and leadership and team

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performance in the total sample, in the sample with the traditional moderator variable, and the one with the non-traditional moderator variable.

The f2 shows that the construct was very useful for the fit of the model, having found these values for all the leaderships, except for Transactional, which has an average utility fit of the model.

With regard to **transformational** leadership, in the study by Pearce and Sims Jr (2002), the hypothesis was partially supported because it was evaluated by three distinct items, being positively related to team performance. In this study it was supported, confirming the theory. The hypothesis for comparison is that **empowering** leadership is positively related to team performance, which was marginally supported in the study by Pearce and Sims Jr (2002) and is fully supported in this research, considering such factors as a greater focus on leadership development for this style of leadership and the segment of the organizations addressed.

Pearce and Sims Jr (2002) failed to support the hypothesis that **transactional** leadership is positively related to team performance. In contrast, in this study this hypothesis was supported, having factors that may have contributed to this fact: cultural issues related to the country in which the questionnaire was applied, as well as the segment of the organizations covered, or even the time elapsed between the studies.

According to the analysis of the result for the traditional project management method, the transactional leader is positively related to the performance of the team according to the theory, unlike non-traditional management, which presupposes a negative relationship between transactional leadership and team performance in theory, but was presented in a positive way in the analyses. This result may indicate that this style is still used in organizations and that it has an effective result. The transformational leader relates positively to team performance for the two values of the project management moderator, both in theory and in this study.

Finally, the analysis of empowering leadership presupposes a negative relationship with team performance for traditional project management in theory, but the analyses indicate a positive relationship, which may indicate that leadership sharing is a style in use in traditional management and is well endorsed by team members. Non-traditional project management also showed a positive relationship with team performance in the analyses as well as in theory.

The analyses indicate that the moderation of project management has no effect on the samples, because the results presented in the total sample and when we use the moderator variable do not show any significant variance in team performance,. The variation in the path coefficient is moderate in all samples, not showing any great variation. Thus, hypotheses H1a, H2a, H3a, and H4a were rejected.

5 Conclusions

This work complements the study carried out by Pearce and Sims Jr (2002), who analyzed the relationship between team performance and various leadership styles, because we verified the influence on this relationship of the project management in its two models: traditional methods, based, for example, on PMBoK, PRINCE2, or IPMA, and non-traditional ones, based on agile frameworks such as Scrum. This research made it possible to deepen the study of the relationship between leadership, team performance, and project management, thus expanding the current scientific knowledge.

The main objective was to identify the influence of the type of leadership on the performance of the project team**,** according to the methods applied in the management of software development projects in various industries and sectors**.** The constructs of leadership and team performance are very important and studied in academic circles, and are increasingly important in organizations, especially in those that manage projects for the development of new products, whether they are products or software**.**

To achieve the main objective of this work, we identified two secondary objectives. The first one was to identify the influence of the type of leadership, whether transactional, transformational, or empowering, on the performance of the project team, with three hypotheses being created relating each one of the types of leadership with the performance of the team and giving rise to a fourth hypothesis. H1 proposed a positive relationship between these two constructs, which was confirmed in this study, unlike in the study by Pearce and Sims Jr (2002), where it was refuted. H2 proposed a positive relationship between this style of leadership with the performance of the team, which was also confirmed in both studies. H3 proposed a positive relationship between this leadership and team performance, which was confirmed in both studies.

We identified that transactional leadership has a strong and positive relationship with the performance of the team, but contributes moderately to the fit of the model. Transformational leadership has a strong and positive relationship with team performance, and finally, empowering leadership also has a strong and positive relationship with team performance. With this analysis, we identified the influence of the type of leadership, whether transactional, transformational, or empowering, on the performance of the project team, with the confirmation of hypotheses H1, H2, and H3, leading to the confirmation of H4, which confirms the positive relationship between leadership and team performance.

To achieve the second secondary objective, we formulated hypotheses H1a, H2a, H3a, and H4a. We can conclude, based on the rejection of the four hypotheses formulated, that the applied project management method does not influence the relationship between leadership and performance, because the impact was not significantly changed nor was the sign of the relationship between the leadership and team performance.

With the results obtained in this research, we verified that the leadership styles have a direct relationship with the performance of the team. This study validates previous studies demonstrating the relationship between leadership and team performance. However, it showed that there is no significant influence of the method adopted in project management, whether positive or negative, on this relationship. Thus, an organization that works with bimodal IT, that is, using projects managed by traditional and non-traditional methodologies, would not have to identify a project manager with a specific leadership type in each of the modes. Because leadership influences team performance, we suggest that organizations invest in the development of their leaders, by various means such as training, coaching, and mentoring.

We limited this study to software development projects and Brazilian national organizations, not verifying other variables that interact in the social process of leadership, including motivation of those being led, type of organizational structure, task, or mission. Another limitation of the research was the industry, where the largest volume of respondents were concentrated in the sector of private sector financial activities, with approximately one thousand to two thousand employees. For future studies, we suggest the application of the research in other industries and in other sectors, as well as project teams from countries other than Brazil, thus broadening the scope of the study.

Leadership styles and team performance were based on the study by Pearce and Sims Jr (2002), and there are other approaches to leadership style as well as team performance. We therefore suggest using other approaches, to compare the results with this research, such as longitudinal research to assess the impact of leadership during the project life cycle and maturity of the team during the project.

We suggest deepening the evaluation of the results of this research through case studies or in-depth interviews. One example would be

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to verify the reason why transactional leadership moderately contributes to the fit of the model, assessing the reasons for the change in leadership style.

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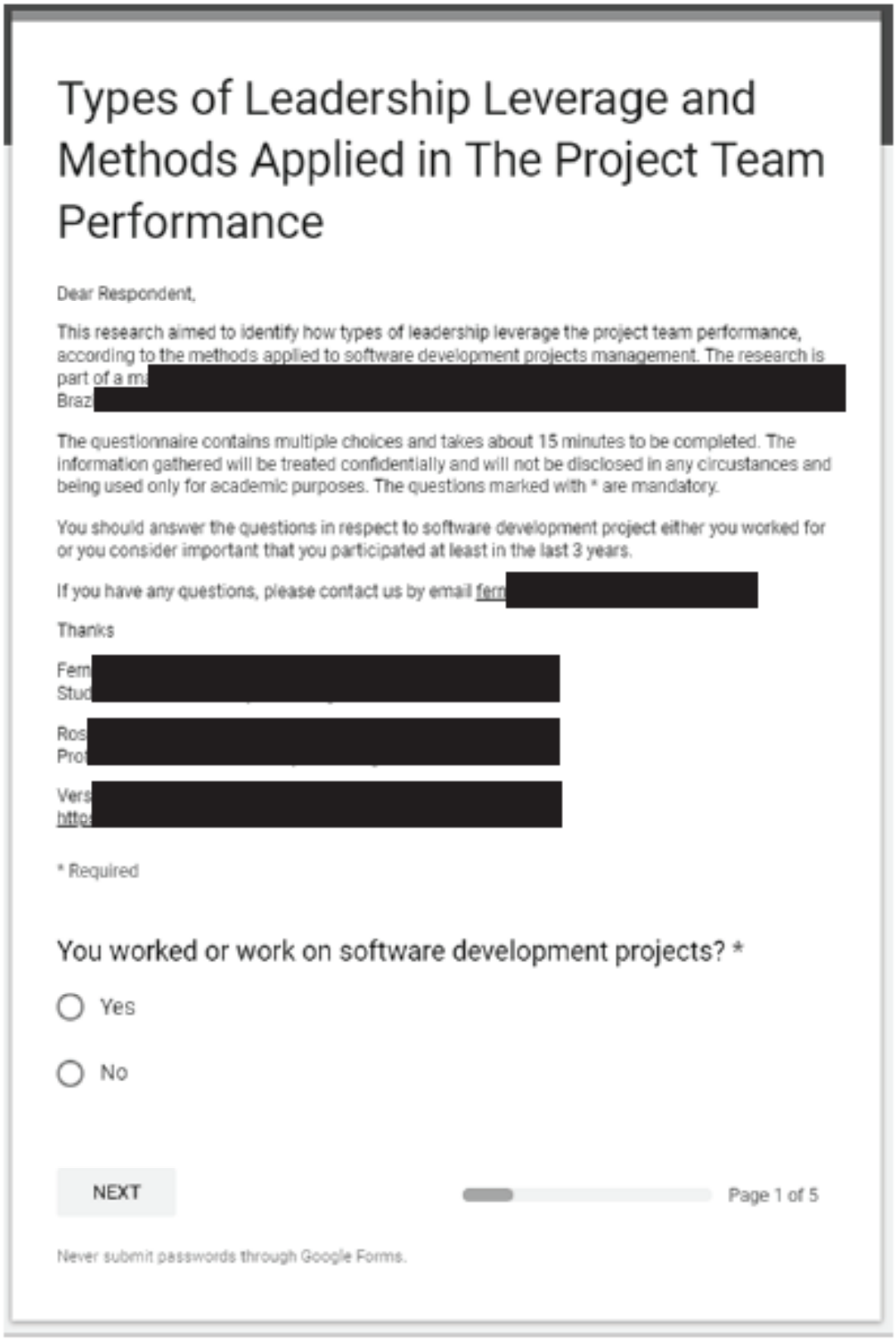
Appendix A - Collection instrument



Types of Leadership Leverage and Methods Applied in The Project Team Performance

Dear Respondent,

This research aimed to identify how types of leadership leverage the project team performance, according to the methods applied to software development projects management. The research is part of a ma
Braz

The questionnaire contains multiple choices and takes about 15 minutes to be completed. The information gathered will be treated confidentially and will not be disclosed in any circustances and being used only for academic purposes. The questions marked with * are mandatory.

You should answer the questions in respect to software development project either you worked for or you consider important that you participated at least in the last 3 years.

If you have any questions, please contact us by email fern

Thanks

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* Required

You worked or work on software development projects? *

Yes

No

NEXT

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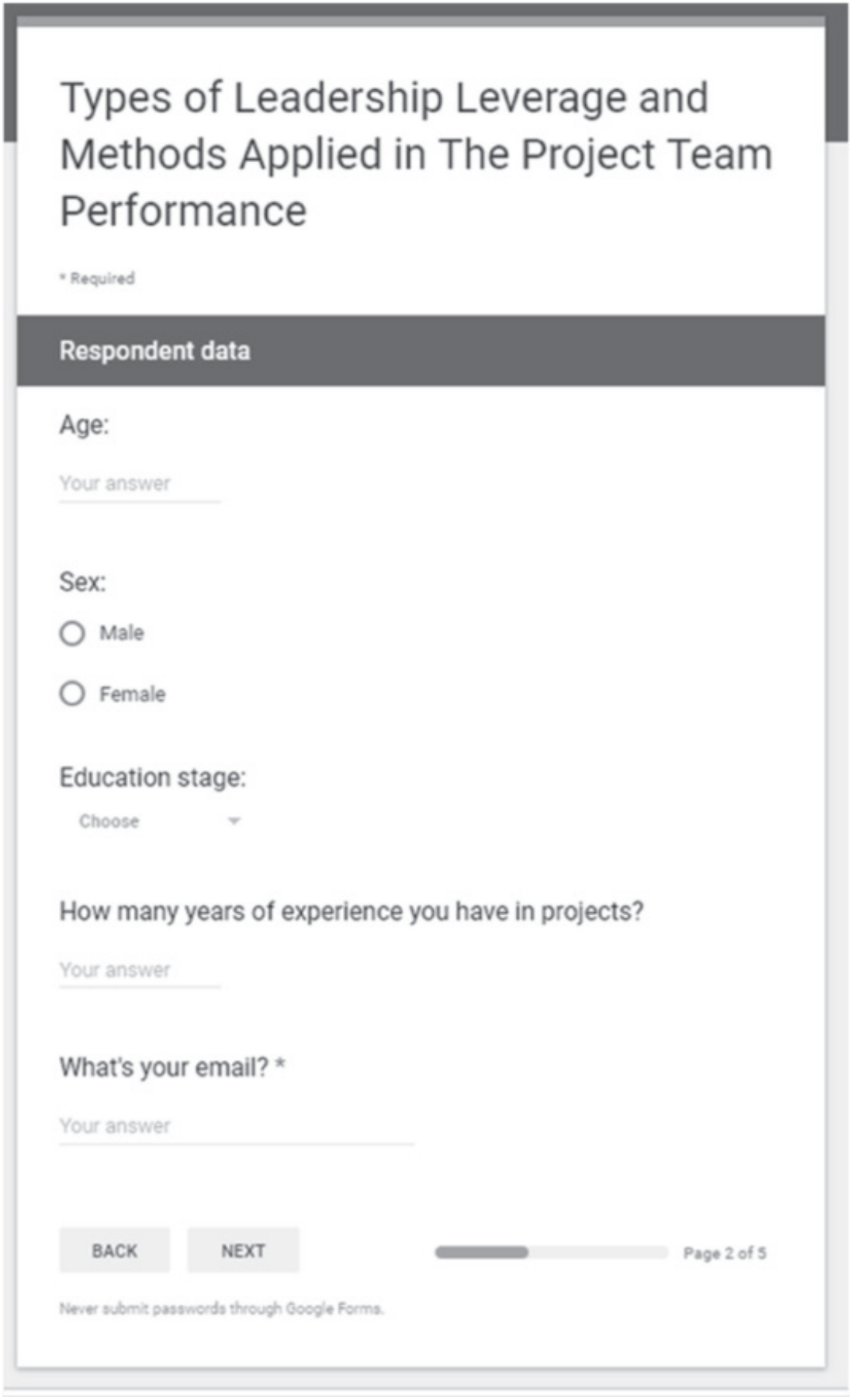
If the answer is Yes, the respondent continues the questionnaire.
If the answer is No, they are directed to the end of the questionnaire.



Types of Leadership Leverage and Methods Applied in The Project Team Performance

* Required

Respondent data

Age:

Your answer

Sex:

Male

Female

Education stage:

Choose

How many years of experience you have in projects?

Your answer

What's your email? *

Your answer

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Types of Leadership Leverage and Methods Applied in The Project Team Performance

* Required

Project

You should answer the questions in respect to software development project either you worked for or you consider important that you participated at least in the last 3 years.

Name of the project:

Your answer

Product/Service Description: *
A brief description of the product produced by the project

Your answer

Number of members of the project team: *

Your answer

Which areas were involved in the project?

Your answer

What was your position in the project? *

- ○ Leader
- ○ Team Member

The chosen of project management methodology is based on which of the methods or frameworks or best practice guide? *

- ○ PMBoK
- ○ PRINCE2
- ○ ICB - IPMA
- ○ Agile methods (Example: SCRUM)
- ○ Other: _____

Type of company:

- ○ Public
- ○ Private
- ○ Joint Stock

What is the main area of activity of the company?

Choose

Number of employees in your company?

Your answer

What is the annual revenue of the company in millions?

Your answer

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Types of Leadership Leverage and Methods Applied in The Project Team Performance

* Required

Project Performance

For each phrase, select the closest alternative reality with the project you described on the previous page.

*

You should answer the questions in respect to software development project either you worked for or you consider important that you participated at least in the last 3 years.

	Definitely Not True	Not True	Neither True, Nor Untrue	True	Definitely True
The team does a very good job.	○	○	○	○	○
The team does very good work.	○	○	○	○	○
The team provides a volume of work consistent with established standards.	○	○	○	○	○
The team has its priorities straight.	○	○	○	○	○
The team is highly effective.	○	○	○	○	○
The team faces new problems effectively.	○	○	○	○	○
The team's contribution to the company is very valuable.	○	○	○	○	○
The team is highly effective at implementing solutions.	○	○	○	○	○
The team performs duties accurately and consistently.	○	○	○	○	○

The contributions of this team are very valuable to the company.	○	○	○	○	○
The team develops workable plans.	○	○	○	○	○
The quality of the team's output is very high.	○	○	○	○	○
The team communicates its progress.	○	○	○	○	○
The team delivers important changes.	○	○	○	○	○
The team keeps everyone informed.	○	○	○	○	○
The team eliminates root problems, not just symptoms.	○	○	○	○	○
The team makes valuable contributions to the company.	○	○	○	○	○
The team is making very good progress on the team's charter.	○	○	○	○	○
The team delivers its commitment.	○	○	○	○	○
The team copes with change very well.	○	○	○	○	○
The team keeps everyone informed on its progress.	○	○	○	○	○
The team proactively communicates its progress.	○	○	○	○	○
The team delivers its commitments on time.	○	○	○	○	○

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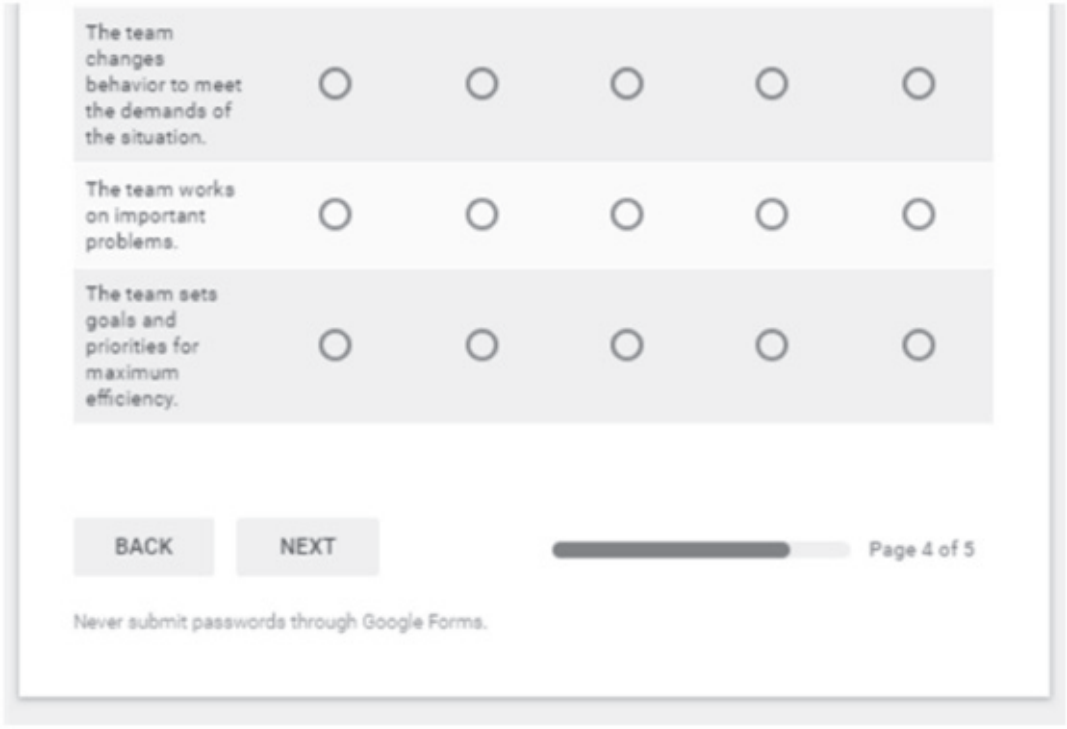
The team changes behavior to meet the demands of the situation.
The team works on important problems.
The team sets goals and priorities for maximum efficiency.
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Types of Leadership Leverage and Methods Applied in The Project Team Performance

* Required

Project Leadership

For each phrase, select the closest alternative reality with the project you described on the page 3.

*

You should answer the questions in respect to software development project either you worked for or you consider important that you participated at least in the last 3 years.

	Definitely Not True	Not True	Neither True, Nor Untrue	True	Definitely True
My team leader closely monitors my performance for errors.	○	○	○	○	○
My team leader will recommend that I am compensated more if I perform well.	○	○	○	○	○
My team leader encourages me to find solutions to my problems without his/her direct input.	○	○	○	○	○
My team leader allows performance to fall below minimum standards before trying to make improvements.	○	○	○	○	○
My team leader expects me to perform at my highest level.	○	○	○	○	○
My team leader tracks mistakes.	○	○	○	○	○

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My team leader encourages me to rethink ideas which had never been questioned before.	○	○	○	○	○
My team leader commends me when I do a better-than-average job.	○	○	○	○	○
My team leader encourages me to seek out educational opportunities.	○	○	○	○	○
My team leader shows enthusiasm for my efforts.	○	○	○	○	○
My team leader encourages me to seek out opportunities to learn.	○	○	○	○	○
My team leader encourages me to learn new things.	○	○	○	○	○
My team leader encourages me to give myself a pat on the back when I meet a new challenge.	○	○	○	○	○
Because of my team leader, I have a clear vision of our team's purpose.	○	○	○	○	○
My team leader advises me to solve problems when they pop up without always getting a stamp of approval.	○	○	○	○	○
My team leader and I sit down together and reach agreement on my performance goals.	○	○	○	○	○

My team leader delays taking action until problems become serious.	○	○	○	○	○
My team leader gives me positive feedback when I perform well.	○	○	○	○	○
My team leader encourages me to treat myself to something I enjoy when I do a task especially well.	○	○	○	○	○
My team leader focuses attention on irregulars, mistakes, exceptions, and deviations from standard.	○	○	○	○	○
My team leader seeks a broad range of perspectives when solving problems.	○	○	○	○	○
My team leader will recommend that I am compensated well if I perform well.	○	○	○	○	○
My team leader isn't afraid to "break the mold" to find different ways of doing things.	○	○	○	○	○
My team leader urges me to think of problems as opportunities rather than obstacles.	○	○	○	○	○
My team leader isn't afraid to "buck the system" if he/she thinks it is necessary.	○	○	○	○	○
My team leader					

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My team leader and I work together to decide what my performance goals should be.	○	○	○	○	○
My team leader spends time "putting out fires".	○	○	○	○	○
My team leader directs attention toward failure to meet standards.	○	○	○	○	○
My team leader is non-traditional type that "shakes up the system" when necessary.	○	○	○	○	○
My team leader works with me to develop my performance goals.	○	○	○	○	○
My team leader encourages me to go above and beyond what is normally expected of one (e.g., extra effort).	○	○	○	○	○
My team leader is driven by higher purposes or ideals.	○	○	○	○	○
My team leader encourages me to view unsuccessful performance as a chance to learn.	○	○	○	○	○
My team leader has a strong personal dedication to higher purposes or ideals.	○	○	○	○	○
My team leader questions the traditional way of doing things.	○	○	○	○	○

My team leader urges me to reward myself with something I like when I have successfully completed a major task.	○	○	○	○	○
My team leader urges me to work as a team with other individuals who are part of the team.	○	○	○	○	○
My team leader encourages me to learn by extending myself.	○	○	○	○	○
My team leader approaches a new project or task in an enthusiastic way.	○	○	○	○	○
My team leader advises me to coordinate my efforts with other individuals who are part of the team.	○	○	○	○	○
My team leader urges me to assume responsibilities on my own.	○	○	○	○	○
My team leader provides a clear vision of where our team is going.	○	○	○	○	○
My team leader stresses the importance of our team to the larger organization.	○	○	○	○	○
My team leader shows firm belief in "if it ain't broke don't fix it".	○	○	○	○	○
My team leader provides a clear vision of who and what our team is.	○	○	○	○	○
My team leader					

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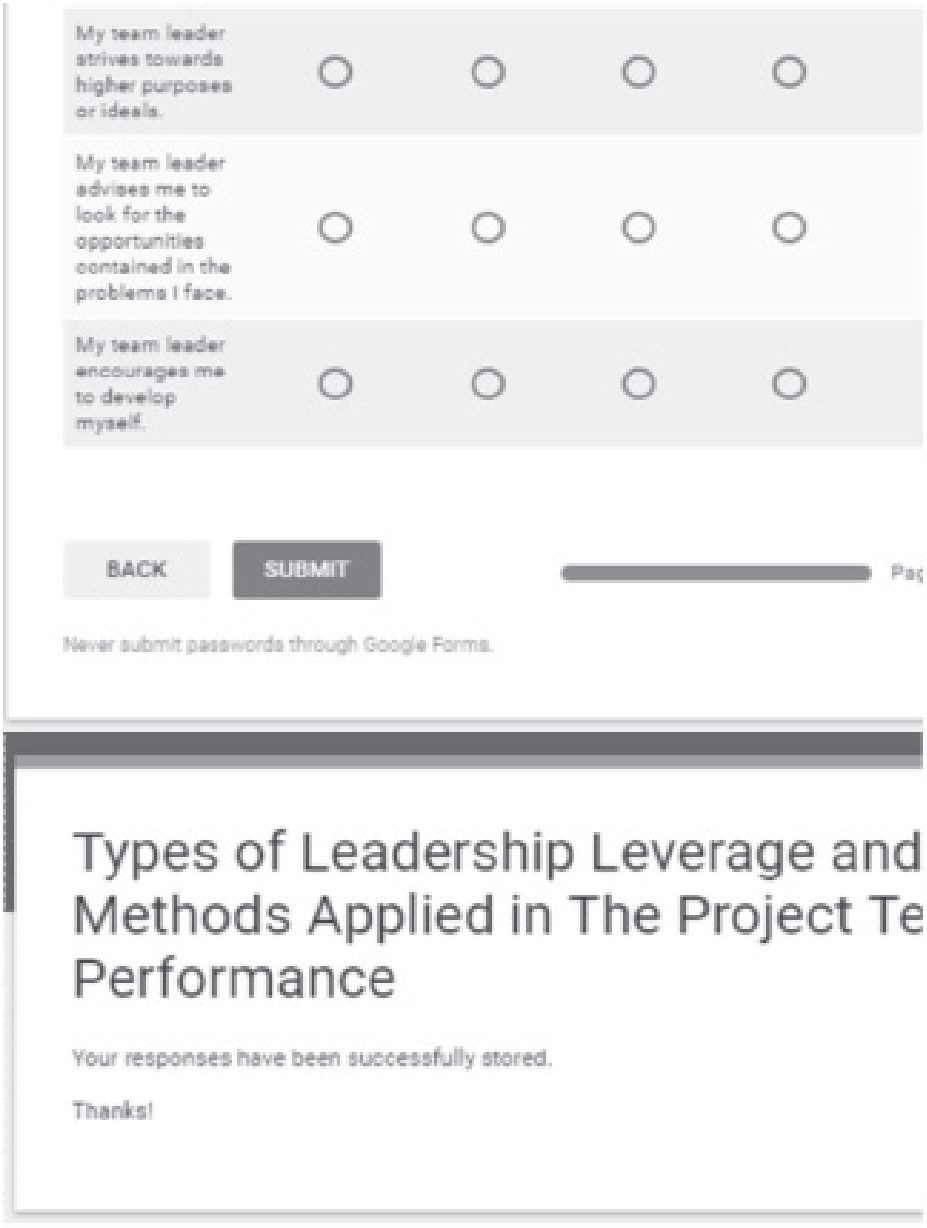
My team leader looks at problems from many different angles.	○	○	○	○	○
My team leader expects me to give 100% all of the time.	○	○	○	○	○
My team leader encourages me to search for solutions to my problems without supervision.	○	○	○	○	○
If I perform well, my team leader will recommend more compensation.	○	○	○	○	○
My team leader gives me special recognition when my work performance is especially good.	○	○	○	○	○
My team leader waits until things have gone wrong before taking action.	○	○	○	○	○
My team leader emphasizes the value of questioning team members.	○	○	○	○	○
My team leader encourages me to work together with other individuals who are part of the team.	○	○	○	○	○
My team leader encourages me to develop my skills and abilities.	○	○	○	○	○
My team leader tells me what I've done wrong rather than what I've done right.	○	○	○	○	○
My team leader					


My team leader strives towards higher purposes or ideals.
My team leader advises me to look for the opportunities contained in the problems I face.
My team leader encourages me to develop myself.
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Your responses have been successfully stored.
Thanks!

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Appendix B – tables generated during analysis

Table 3.
Evaluation of DV via criteria by Fornell and Larcker, fourth execution

Variable	LE-Encourage Self-Reward	LE-Encourage Sef-Development	LE-Encourage Independent Action	LE-Participative Goal Setting	LE-Encourage Opportunity Thinking	LE-Encourage Teamwork	LTF-Inspirational Communication	LTF-Challenge to Status Quo	LTF-Intellectual Stimulation	LTF-Performance Expectations	LTF-Idealism	LTF-Vision	LTS-Management by Expectation (active)	LTS-Management by Expectation (passive)	LTS-Material Reward	LTS-Personal Reward	PE-Output Effectiveness	PE-Overall Effectiveness	PE-Interpersonal Effectiveness	PE-Change Effectiveness	PE-Org. and Plan. Effectiveness	PE-Quality Effectiveness	PE-Value Effectiveness
LE-Encourage Self-Reward	0,861																						
LE-Encourage Sef-Development	0,766	0,852																					
LE-Encourage Independent Action	0,649	0,654	0,769																				
LE-Participative Goal Setting	0,639	0,576	0,513	0,930																			
LE-Encourage Opportunity Thinking	0,721	0,717	0,580	0,558	0,872																		
LE-Encourage Teamwork	0,477	0,583	0,670	0,412	0,567	0,872																	
LTF-Inspirational Communication	0,784	0,713	0,671	0,569	0,788	0,661	0,852																
LTF-Challenge to Status Quo	0,630	0,706	0,574	0,482	0,668	0,589	0,704	0,876															
LTF-Intellectual Stimulation	0,695	0,741	0,658	0,574	0,776	0,631	0,784	0,734	0,812														
LTF-Performance Expectations	0,411	0,463	0,488	0,437	0,467	0,497	0,415	0,386	0,445	1,000													
LTF-Idealism	0,722	0,750	0,616	0,520	0,708	0,562	0,764	0,674	0,714	0,398	0,871												
LTF-Vision	0,594	0,626	0,641	0,587	0,683	0,675	0,712	0,654	0,698	0,386	0,684	0,887											
LTS-Management by Expectation (active)	0,394	0,306	0,298	0,270	0,274	0,234	0,327	0,214	0,277	0,104	0,280	0,225	0,738										
LTS-Management by Expectation (passive)	0,126	-0,079	0,155	0,032	-0,043	-0,056	-0,046	-0,042	-0,007	0,095	-0,059	-0,063	0,443	0,724									
LTS-Material Reward	0,739	0,725	0,635	0,511	0,584	0,510	0,658	0,628	0,630	0,412	0,593	0,558	0,247	0,020	0,929								
LTS-Personal Reward	0,763	0,749	0,698	0,642	0,764	0,578	0,789	0,677	0,735	0,508	0,759	0,691	0,329	0,023	0,720	0,839							
PE-Output Effectiveness	0,248	0,286	0,241	0,185	0,322	0,382	0,391	0,405	0,384	0,310	0,288	0,462	0,142	-0,001	0,261	0,326	0,758						
PE-Overall Effectiveness	0,353	0,398	0,328	0,209	0,350	0,424	0,455	0,495	0,475	0,349	0,402	0,483	0,156	-0,025	0,391	0,400	0,752	0,846					
PE-Interpersonal Effectiveness	0,296	0,339	0,291	0,251	0,346	0,401	0,403	0,412	0,408	0,255	0,362	0,531	0,181	-0,067	0,342	0,410	0,629	0,614	0,866				
PE-Change Effectiveness	0,313	0,384	0,335	0,264	0,348	0,432	0,423	0,449	0,404	0,299	0,334	0,502	0,210	-0,077	0,350	0,405	0,638	0,660	0,616	0,800			
PE-Org. and Plan. Effectiveness	0,298	0,305	0,334	0,203	0,378	0,389	0,460	0,456	0,457	0,259	0,357	0,489	0,183	-0,025	0,330	0,463	0,670	0,664	0,641	0,629	0,789		
PE-Quality Effectiveness	0,353	0,395	0,389	0,236	0,403	0,473	0,471	0,516	0,540	0,375	0,411	0,591	0,133	-0,032	0,399	0,431	0,726	0,786	0,624	0,667	0,678	0,819	
PE-Value Effectiveness	0,241	0,254	0,253	0,221	0,252	0,351	0,398	0,373	0,386	0,263	0,257	0,421	0,201	0,008	0,303	0,331	0,570	0,681	0,438	0,532	0,577	0,537	0,894

Source: The authors

Table 4.
AVE of VLs, first execution

LV 1st order	Cronbach Alpha	rho_A	Composite Reliability	AVE
LE-Encourage Self-Reward	0,826	0,827	0,896	0,741
LE-Encourage Sef-Development	0,924	0,928	0,941	0,725
LE-Encourage Independent Action	0,770	0,782	0,852	0,591
LE-Participative Goal Setting	0,922	0,923	0,951	0,866
LE-Encourage Opportunity Thinking	0,843	0,843	0,905	0,761
LE-Encourage Teamwork	0,842	0,843	0,905	0,761
LTF-Inspirational Communication	0,811	0,812	0,888	0,727
LTF-Challenge to Status Quo	0,848	0,853	0,908	0,767
LTF-Intellectual Stimulation	0,870	0,873	0,906	0,659
LTF-Performance Expectations	0,524	0,576	0,724	**0,488**
LTF-Idealism	0,841	0,849	0,904	0,759
LTF-Vision	0,865	0,866	0,917	0,787
LTS-Management by Expectation (active)	0,675	0,676	0,748	**0,423**
LTS-Management by Expectation (passive)	0,788	0,220	0,616	**0,316**
LTS-Material Reward	0,920	0,920	0,949	0,862
LTS-Personal Reward	0,790	0,793	0,877	0,704
PE-Output Effectiveness	0,800	0,801	0,862	0,556
PE-Overall Effectiveness	0,867	0,869	0,910	0,716
PE-Interpersonal Effectiveness	0,888	0,890	0,923	0,750
PE-Change Effectiveness	0,720	0,730	0,842	0,640
PE-Org. and Plan. Effectiveness	0,797	0,800	0,868	0,622
PE-Quality Effectiveness	0,754	0,759	0,859	0,670
PE-Value Effectiveness	0,875	0,885	0,923	0,799

Source: The authors

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Table 5.
Cross loads

OV	LE-Encourage Self-Reward	LE-Encourage Sef-Development	LE-Encourage Independent Action	LE-Participative Goal Setting	LE-Encourage Opportunity Thinking	LE-Encourage Teamwork	LTF-Inspirational Communication	LTF-Challenge to Status Quo	LTF-Intellectual Stimulation	LTF-Performance Expectations	LTF-Idealism	LTF-Vision	LTS-Management by Expectation (active)	LTS-Management by Expectation (passive)	LTS-Material Reward	LTS-Personal Reward	PE-Output Effectiveness	PE-Overall Effectiveness	PE-Interpersonal Effectiveness	PE-Change Effectiveness	PE-Org. and Plan. Effectiveness	PE-Quality Effectiveness	PE-Value Effectiveness
LEAR_1	0,840	0,660	0,505	0,529	0,617	0,438	0,657	0,487	0,529	0,383	0,623	0,449	0,343	0,009	0,598	0,645	0,181	0,264	0,223	0,172	0,240	0,258	0,179
LEAR_2	0,877	0,604	0,584	0,573	0,583	0,350	0,655	0,523	0,561	0,304	0,583	0,519	0,396	0,216	0,631	0,627	0,203	0,238	0,231	0,244	0,165	0,267	0,163
LEAR_3	0,866	0,712	0,585	0,548	0,660	0,441	0,710	0,610	0,698	0,412	0,655	0,563	0,283	0,103	0,676	0,696	0,310	0,403	0,306	0,384	0,357	0,382	0,275
LEAD_1	0,721	0,886	0,615	0,550	0,673	0,549	0,641	0,653	0,642	0,481	0,638	0,563	0,258	-0,074	0,681	0,723	0,267	0,336	0,309	0,303	0,271	0,333	0,215
LEAD_2	0,692	0,861	0,651	0,572	0,694	0,553	0,654	0,565	0,692	0,465	0,671	0,581	0,229	-0,075	0,670	0,722	0,235	0,321	0,311	0,281	0,235	0,344	0,231
LEAD_3	0,660	0,844	0,567	0,443	0,643	0,557	0,647	0,670	0,702	0,336	0,664	0,609	0,342	-0,085	0,642	0,606	0,344	0,465	0,289	0,409	0,323	0,429	0,340
LEAD_4	0,547	0,812	0,461	0,435	0,472	0,399	0,491	0,548	0,544	0,261	0,614	0,455	0,169	-0,067	0,506	0,515	0,236	0,308	0,203	0,291	0,212	0,285	0,167
LEAD_5	0,601	0,833	0,487	0,434	0,531	0,420	0,582	0,547	0,599	0,372	0,559	0,431	0,268	0,012	0,519	0,575	0,242	0,256	0,296	0,332	0,235	0,310	0,165
LEAD_6	0,674	0,872	0,536	0,491	0,620	0,479	0,610	0,617	0,595	0,325	0,681	0,543	0,292	-0,107	0,661	0,656	0,272	0,336	0,314	0,351	0,274	0,310	0,170
LEAI_1	0,399	0,329	0,696	0,298	0,246	0,370	0,379	0,270	0,385	0,258	0,426	0,389	0,276	0,273	0,300	0,365	0,210	0,251	0,215	0,204	0,179	0,285	0,208
LEAI_2	0,486	0,539	0,797	0,419	0,537	0,619	0,549	0,466	0,564	0,445	0,460	0,545	0,208	-0,005	0,502	0,541	0,242	0,285	0,297	0,262	0,235	0,315	0,255
LEAI_3	0,553	0,564	0,746	0,445	0,447	0,512	0,538	0,519	0,495	0,474	0,472	0,559	0,212	0,075	0,555	0,602	0,259	0,297	0,254	0,350	0,354	0,331	0,224
LEAI_4	0,538	0,536	0,830	0,393	0,500	0,523	0,566	0,466	0,553	0,433	0,531	0,455	0,241	0,187	0,549	0,597	0,127	0,181	0,130	0,203	0,239	0,267	0,099
LEMP_1	0,635	0,545	0,473	0,924	0,521	0,351	0,537	0,458	0,534	0,442	0,496	0,545	0,268	0,038	0,480	0,588	0,221	0,229	0,246	0,302	0,222	0,228	0,266
LEMP_2	0,564	0,522	0,462	0,934	0,487	0,396	0,530	0,417	0,489	0,467	0,475	0,534	0,252	0,003	0,477	0,584	0,166	0,175	0,227	0,233	0,132	0,205	0,171
LEMP_3	0,583	0,540	0,496	0,934	0,549	0,404	0,522	0,469	0,577	0,416	0,481	0,558	0,234	0,047	0,470	0,619	0,212	0,180	0,226	0,201	0,209	0,226	0,178
LEOP_1	0,628	0,594	0,571	0,512	0,860	0,551	0,690	0,562	0,670	0,517	0,600	0,652	0,217	0,000	0,480	0,666	0,391	0,358	0,335	0,322	0,352	0,410	0,285
LEOP_2	0,585	0,690	0,445	0,455	0,876	0,515	0,682	0,602	0,691	0,343	0,614	0,552	0,250	-0,070	0,528	0,652	0,219	0,269	0,276	0,304	0,284	0,292	0,179
LEOP_3	0,675	0,592	0,501	0,492	0,880	0,415	0,690	0,585	0,671	0,360	0,638	0,582	0,251	-0,043	0,520	0,683	0,266	0,286	0,293	0,285	0,351	0,352	0,193
LETE_1	0,445	0,460	0,578	0,288	0,512	0,849	0,622	0,499	0,571	0,462	0,511	0,553	0,230	-0,017	0,401	0,496	0,364	0,427	0,292	0,336	0,374	0,359	0,356
LETE_2	0,389	0,527	0,599	0,336	0,475	0,905	0,585	0,522	0,546	0,559	0,497	0,607	0,209	-0,054	0,425	0,526	0,398	0,365	0,365	0,402	0,351	0,440	0,316
LETE_3	0,414	0,536	0,575	0,448	0,497	0,861	0,525	0,519	0,534	0,551	0,464	0,604	0,175	-0,073	0,505	0,489	0,328	0,322	0,389	0,391	0,296	0,435	0,250
LTFCI_1	0,693	0,603	0,641	0,523	0,655	0,606	0,865	0,561	0,653	0,490	0,685	0,628	0,236	-0,004	0,549	0,713	0,322	0,396	0,342	0,316	0,381	0,386	0,329
LTFCI_2	0,732	0,601	0,507	0,503	0,733	0,481	0,874	0,628	0,709	0,446	0,643	0,537	0,289	-0,024	0,582	0,698	0,355	0,362	0,287	0,314	0,429	0,385	0,331
LTFCI_3	0,577	0,620	0,569	0,429	0,626	0,604	0,818	0,609	0,642	0,376	0,625	0,658	0,312	-0,088	0,551	0,607	0,379	0,405	0,402	0,454	0,366	0,433	0,359
LTFDQ_1	0,628	0,650	0,542	0,489	0,631	0,498	0,662	0,897	0,665	0,370	0,634	0,593	0,219	-0,048	0,568	0,680	0,343	0,387	0,357	0,384	0,397	0,394	0,263
LTFDQ_2	0,535	0,605	0,519	0,416	0,535	0,450	0,570	0,847	0,567	0,342	0,512	0,525	0,181	0,106	0,571	0,564	0,302	0,339	0,271	0,322	0,316	0,371	0,266
LTFDQ_3	0,490	0,600	0,448	0,361	0,585	0,594	0,613	0,882	0,689	0,416	0,617	0,596	0,162	-0,152	0,515	0,532	0,522	0,565	0,446	0,467	0,476	0,584	0,446
LTFEI_1	0,508	0,571	0,450	0,433	0,616	0,503	0,632	0,601	0,800	0,418	0,562	0,565	0,218	-0,098	0,468	0,550	0,324	0,371	0,241	0,298	0,218	0,447	0,315
LTFEI_2	0,575	0,571	0,464	0,492	0,622	0,459	0,627	0,683	0,813	0,393	0,543	0,497	0,182	0,029	0,486	0,547	0,389	0,401	0,327	0,356	0,392	0,453	0,276
LTFEI_3	0,548	0,610	0,491	0,485	0,558	0,394	0,551	0,551	0,776	0,317	0,533	0,466	0,151	0,045	0,498	0,548	0,278	0,342	0,282	0,253	0,352	0,323	0,253
LTFEI_4	0,601	0,621	0,632	0,484	0,649	0,582	0,657	0,603	0,841	0,322	0,615	0,671	0,281	0,009	0,610	0,665	0,409	0,424	0,449	0,372	0,484	0,489	0,383
LTFEI_5	0,587	0,636	0,623	0,439	0,698	0,604	0,705	0,541	0,827	0,459	0,637	0,620	0,280	-0,007	0,491	0,666	0,366	0,385	0,345	0,349	0,399	0,468	0,330
LTFEP_1	0,274	0,241	0,378	0,329	0,279	0,487	0,425	0,311	0,314	0,776	0,314	0,320	0,068	-0,091	0,236	0,356	0,303	0,243	0,141	0,280	0,149	0,295	0,314
LTFEP_2	0,411	0,463	0,488	0,437	0,467	0,497	0,415	0,386	0,445	0,851	0,398	0,386	0,104	0,095	0,412	0,508	0,365	0,349	0,255	0,299	0,259	0,375	0,263
LTFIM_1	0,667	0,679	0,543	0,474	0,624	0,513	0,691	0,604	0,649	0,375	0,895	0,667	0,236	-0,123	0,562	0,686	0,325	0,394	0,358	0,371	0,323	0,397	0,284
LTFIM_2	0,545	0,592	0,508	0,412	0,544	0,452	0,604	0,464	0,527	0,424	0,822	0,537	0,228	-0,030	0,499	0,619	0,249	0,273	0,220	0,161	0,207	0,271	0,135
LTFIM_3	0,665	0,684	0,557	0,470	0,674	0,501	0,697	0,678	0,678	0,360	0,895	0,579	0,268	0,003	0,489	0,676	0,299	0,375	0,354	0,322	0,388	0,397	0,241
LTFVC_1	0,505	0,596	0,581	0,470	0,633	0,655	0,673	0,580	0,648	0,431	0,613	0,899	0,220	-0,081	0,496	0,593	0,559	0,543	0,560	0,535	0,500	0,604	0,463
LTFVC_2	0,529	0,550	0,571	0,526	0,570	0,604	0,618	0,604	0,600	0,295	0,584	0,882	0,183	-0,096	0,524	0,635	0,357	0,363	0,413	0,427	0,444	0,483	0,324
LTFVC_3	0,549	0,519	0,553	0,568	0,614	0,536	0,604	0,558	0,609	0,431	0,625	0,881	0,195	0,013	0,466	0,612	0,387	0,375	0,436	0,371	0,354	0,482	0,329
LTSGA_1	0,215	0,198	0,176	0,097	0,114	0,169	0,095	0,070	0,111	0,015	0,097	0,119	0,762	0,384	0,117	0,106	0,009	0,050	0,109	0,124	0,014	0,064	0,074
LTSGA_2	0,278	0,185	0,160	0,296	0,087	0,032	0,134	0,106	0,127	0,067	0,121	0,100	0,697	0,269	0,132	0,155	-0,022	-0,004	0,056	0,112	0,019	0,014	0,070
LTSGA_4	0,382	0,276	0,258	0,225	0,352	0,248	0,417	0,226	0,312	0,084	0,296	0,246	0,792	0,282	0,289	0,371	0,143	0,162	0,178	0,176	0,213	0,123	0,209
LTSGA_5	0,252	0,224	0,262	0,175	0,182	0,199	0,230	0,190	0,211	0,139	0,258	0,160	0,698	0,392	0,144	0,270	0,161	0,210	0,166	0,193	0,234	0,166	0,202
LTSGP_1	0,099	-0,041	0,201	-0,018	0,014	0,029	0,029	0,005	0,031	0,045	-0,020	-0,018	0,412	0,887	0,047	0,081	0,001	0,006	-0,026	-0,027	0,019	0,011	0,030
LTSGP_2	0,156	-0,058	0,095	0,111	-0,051	-0,105	-0,069	-0,062	0,010	-0,006	-0,006	-0,048	0,304	0,793	0,019	0,000	-0,050	-0,071	-0,121	-0,145	-0,079	-0,083	-0,026
LTSGP_4	-0,009	-0,176	-0,062	-0,007	-0,181	-0,210	-0,212	-0,108	-0,174	-0,093	-0,265	-0,188	0,320	0,700	-0,091	-0,150	0,023	-0,028	-0,055	-0,056	-0,061	-0,044	0,006
LTSGP_5	0,006	-0,116	-0,042	-0,031	-0,121	-0,067	-0,130	-0,099	-0,132	-0,019	-0,164	-0,124	0,287	0,432	-0,092	-0,131	0,003	0,061	0,091	0,096	0,054	0,009	-0,013

OV	LE-Encourage Self-Reward	LE-Encourage Sef-Development	LE-Encourage Independent Action	LE-Participative Goal Setting	LE-Encourage Opportunity Thinking	LE-Encourage Teamwork	LTF-Inspirational Communication	LTF-Challenge to Status Quo	LTF-Intellectual Stimulation	LTF-Performance Expectations	LTF-Idealism	LTF-Vision	LTS-Management by Expectation (active)	LTS-Management by Expectation (passive)	LTS-Material Reward	LTS-Personal Reward	PE-Output Effectiveness	PE-Overall Effectiveness	PE-Interpersonal Effectiveness	PE-Change Effectiveness	PE-Org. and Plan. Effectiveness	PE-Quality Effectiveness	PE-Value Effectiveness
LTSRM_1	0,684	0,675	0,597	0,502	0,577	0,488	0,593	0,635	0,583	0,432	0,585	0,502	0,181	-0,022	0,936	0,680	0,283	0,375	0,333	0,351	0,306	0,405	0,265
LTSRM_2	0,635	0,663	0,584	0,472	0,505	0,469	0,599	0,531	0,598	0,335	0,534	0,526	0,235	0,014	0,924	0,651	0,297	0,362	0,342	0,286	0,312	0,371	0,298
LTSRM_3	0,737	0,681	0,590	0,451	0,544	0,465	0,640	0,583	0,573	0,366	0,532	0,527	0,271	0,062	0,926	0,676	0,262	0,352	0,277	0,338	0,302	0,337	0,280
LTSRP_1	0,573	0,576	0,572	0,543	0,612	0,526	0,592	0,483	0,555	0,406	0,587	0,574	0,272	0,006	0,547	0,827	0,207	0,210	0,330	0,271	0,268	0,242	0,140
LTSRP_2	0,609	0,585	0,614	0,491	0,713	0,542	0,741	0,619	0,713	0,511	0,639	0,607	0,233	0,018	0,542	0,849	0,383	0,427	0,392	0,328	0,501	0,479	0,371
LTSRP_3	0,726	0,711	0,571	0,576	0,604	0,399	0,655	0,596	0,588	0,438	0,678	0,560	0,317	0,033	0,709	0,841	0,306	0,366	0,314	0,410	0,393	0,364	0,316
PEES_1	0,076	0,075	0,085	-0,009	0,168	0,215	0,224	0,198	0,169	0,212	0,153	0,279	0,107	0,043	0,004	0,131	0,772	0,550	0,468	0,490	0,504	0,562	0,426
PEES_2	0,188	0,206	0,137	0,189	0,247	0,263	0,306	0,326	0,297	0,234	0,238	0,339	0,022	-0,069	0,205	0,250	0,760	0,562	0,429	0,424	0,492	0,547	0,373
PEES_3	0,209	0,278	0,252	0,203	0,227	0,409	0,319	0,334	0,339	0,300	0,264	0,460	0,098	-0,051	0,226	0,265	0,727	0,621	0,460	0,526	0,472	0,529	0,489
PEES_4	0,253	0,294	0,273	0,233	0,274	0,388	0,349	0,431	0,452	0,449	0,367	0,429	0,005	-0,054	0,326	0,334	0,778	0,699	0,403	0,524	0,536	0,709	0,512
PEES_5	0,278	0,305	0,253	0,179	0,331	0,266	0,335	0,369	0,358	0,324	0,217	0,318	0,200	0,069	0,352	0,339	0,687	0,541	0,542	0,485	0,559	0,560	0,435
PEEG_1	0,318	0,284	0,319	0,194	0,286	0,390	0,400	0,386	0,382	0,376	0,324	0,430	0,080	0,005	0,351	0,358	0,640	0,837	0,460	0,518	0,561	0,635	0,606
PEEG_2	0,342	0,487	0,303	0,211	0,383	0,412	0,421	0,512	0,466	0,337	0,428	0,441	0,192	-0,014	0,370	0,406	0,679	0,813	0,525	0,545	0,555	0,602	0,525
PEEG_3	0,218	0,248	0,209	0,094	0,238	0,310	0,323	0,349	0,321	0,201	0,267	0,370	0,125	-0,103	0,275	0,301	0,673	0,835	0,563	0,600	0,600	0,720	0,525
PEEG_4	0,321	0,332	0,283	0,212	0,281	0,330	0,398	0,433	0,441	0,337	0,347	0,400	0,132	0,027	0,331	0,296	0,718	0,897	0,525	0,567	0,532	0,700	0,647
PEEI_1	0,260	0,287	0,263	0,195	0,276	0,386	0,352	0,323	0,326	0,277	0,312	0,435	0,204	0,030	0,279	0,314	0,562	0,523	0,868	0,510	0,511	0,536	0,343
PEEI_2	0,270	0,294	0,227	0,225	0,315	0,287	0,360	0,351	0,375	0,144	0,302	0,442	0,119	-0,143	0,303	0,350	0,498	0,495	0,804	0,514	0,559	0,507	0,421
PEEI_3	0,307	0,328	0,322	0,237	0,343	0,372	0,398	0,397	0,414	0,218	0,354	0,523	0,187	-0,049	0,346	0,404	0,521	0,557	0,893	0,571	0,624	0,576	0,412
PEEI_4	0,185	0,264	0,193	0,210	0,262	0,341	0,283	0,354	0,294	0,221	0,281	0,435	0,115	-0,073	0,253	0,349	0,557	0,547	0,895	0,535	0,523	0,539	0,342
PEEM_1	0,234	0,303	0,257	0,204	0,316	0,382	0,358	0,370	0,324	0,301	0,237	0,460	0,156	-0,091	0,276	0,312	0,572	0,537	0,506	0,812	0,527	0,569	0,526
PEEM_2	0,247	0,337	0,295	0,251	0,305	0,346	0,297	0,363	0,306	0,257	0,233	0,388	0,175	-0,063	0,269	0,279	0,432	0,479	0,390	0,766	0,388	0,444	0,285
PEEM_3	0,271	0,291	0,259	0,188	0,224	0,313	0,354	0,349	0,338	0,290	0,324	0,359	0,176	-0,034	0,295	0,372	0,560	0,559	0,563	0,820	0,571	0,572	0,437
PEOP_1	0,312	0,253	0,296	0,193	0,354	0,245	0,383	0,379	0,365	0,239	0,287	0,340	0,173	0,049	0,280	0,388	0,528	0,497	0,491	0,507	0,783	0,485	0,366
PEOP_2	0,164	0,142	0,216	0,139	0,235	0,295	0,313	0,335	0,356	0,178	0,250	0,386	0,087	-0,041	0,191	0,336	0,627	0,547	0,556	0,477	0,825	0,613	0,471
PEOP_3	0,171	0,237	0,204	0,034	0,194	0,328	0,318	0,369	0,308	0,170	0,222	0,369	0,072	-0,058	0,267	0,255	0,566	0,556	0,496	0,522	0,769	0,538	0,521
PEOP_4	0,308	0,343	0,348	0,288	0,427	0,361	0,449	0,360	0,417	0,227	0,378	0,449	0,260	-0,023	0,312	0,495	0,438	0,490	0,476	0,477	0,776	0,494	0,455
PEEQ_1	0,248	0,292	0,328	0,166	0,278	0,334	0,359	0,348	0,374	0,327	0,212	0,422	0,126	0,003	0,292	0,276	0,566	0,612	0,466	0,534	0,512	0,789	0,468
PEEQ_2	0,276	0,305	0,285	0,179	0,285	0,396	0,370	0,433	0,449	0,348	0,365	0,493	0,089	-0,022	0,340	0,332	0,741	0,717	0,545	0,542	0,575	0,852	0,496
PEEQ_3	0,345	0,376	0,348	0,237	0,433	0,430	0,430	0,486	0,503	0,344	0,428	0,536	0,114	-0,060	0,348	0,454	0,607	0,597	0,520	0,564	0,578	0,814	0,353
PEEV_1	0,283	0,270	0,232	0,232	0,261	0,355	0,412	0,379	0,366	0,346	0,274	0,438	0,198	-0,038	0,301	0,329	0,508	0,579	0,378	0,513	0,535	0,441	0,899
PEEV_2	0,209	0,213	0,269	0,215	0,235	0,346	0,363	0,353	0,359	0,361	0,232	0,376	0,159	0,057	0,299	0,336	0,618	0,683	0,430	0,506	0,583	0,566	0,912
PEEV_3	0,150	0,199	0,169	0,138	0,175	0,230	0,288	0,262	0,307	0,219	0,179	0,311	0,188	-0,005	0,204	0,212	0,476	0,553	0,362	0,399	0,413	0,420	0,870

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Authors:
1. Fernando Andre Zemuner Garcia, Master of Business Administration, UNINOVE, São Paulo, Brazil.
E-mail: fernando.z.garcia@gmail.com
ORCID
0000-0002-1237-8268
2. Rosária de Fátima Segger Macri Russo, PhD in Sciences (Administration), USP - University of São Paulo, FEA - Faculty of Economics, Administration and Accounting, São Paulo, Brazil.
E-mail: romacrirusso@gmail.com
ORCID
0000-0002-3579-4168

Contribution of each author

Contribution	Fernando Garcia	Rosária Russo
1. Definition of research problem	√	√
2. Development of hypotheses or research questions (empirical studies)	√	√
3. Development of theoretical propositions (theoretical Work)		
4. Theoretical foundation/ Literature review	√	√
5. Definition of methodological procedures	√	√
6. Data collection	√	√
7. Statistical analysis	√	√
8. Analysis and interpretation of data	√	√
9. Critical revision of the manuscript	√	√
10. Manuscript Writing	√	√
11. Other (please specify which)		

Erratum

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