DOI: 10.5902/1983465940719

AN ANALYSIS OF THE INFLUENCE OF ORGANIZATIONAL LEADERSHIP ON INNOVATION MANAGEMENT USING THE FUZZY-AHP METHOD

UMA ANÁLISE SOBRE A INFLUÊNCIA DA LIDERANÇA ORGANIZACIONAL NA GESTÃO DA INOVAÇÃO UTILIZANDO O MÉTODO FUZZY-AHP

Submission: 22/10/19
Accept: 11/10/20

Roger da Silva Wegner[1]
Julia Tontini[1]
Vânia Medianeira Flores Costa[1]
Arthur Muller Junior[1]
Deoclécio Junior Cardoso da Silva[1]

1 Universidade Federal de Santa Maria, Santa Maria, Rio Grande do Sul, Brazil.

ABSTRACT

Purpose – The changes that occurred in the market, resulting from technological advancement, made companies pay attention to innovation in their processes, products or services, as a way to stand out. To enhance innovation in companies, focusing on leadership is an effective way. In this sense, the present study aimed to develop a model in order to list the priorities related to leadership and its interface with innovation, under the top management perspective of a telecommunications company.
Design/methodology/approach – For the development of the model, the Fuzzy Analytic Hierarchy Process (Fuzzy-AHP) method was used to identify such factors and the best alternatives so that the investigated company can make consistent decisions. Thus, the criteria chosen by the Manager and Director were discovered, as well as the alternatives that they cherish, contributing to the development of innovation within the company.
Findings – The results showed that the perception of the two interviewees was similar, however, it is emphasized that they should better choose how to apply innovation within the company.
Originality/value – This study opens the way to highlight the importance of the theme of leadership and its interface with innovation for professionals in the management area, favoring decision making, in addition to contributing to the literature, deepening the debate on the theme of leadership and innovation, which is still incipient and needs development.

Keywords - Leadership; Innovation; Decision-making process; Fuzzy AHP; Management Innovation.

RESUMO

Objetivo – As mudanças ocorridas no mercado, decorrentes do avanço tecnológico, fizeram com que as empresas se preocupassem com a inovação em seus processos, produtos ou serviços, como forma de se destacar. Para potencializar a inovação nas empresas, o foco na liderança é uma forma eficaz. Nesse sentido, o presente estudo teve como objetivo desenvolver um modelo para elencar as prioridades relacionadas à liderança e sua interface com a inovação, sob a perspectiva da alta gestão de uma empresa de telecomunicações.
Design/metodologia/abordagem – Para o desenvolvimento do modelo, foi utilizado o método *Fuzzy Analytic Hierarchy Process* (Fuzzy-AHP) para identificar tais fatores e as melhores alternativas para que a empresa investigada possa tomar decisões consistentes. Assim, foram descobertos os critérios escolhidos pelo Gerente e Diretor, bem como as alternativas que eles prezam, contribuindo para o desenvolvimento da inovação dentro da empresa.
Achados – Os resultados mostraram que a percepção dos dois entrevistados foi semelhante, porém, destaca-se que eles deveriam escolher melhor a forma de aplicar a inovação dentro da empresa.
Originalidade/valor – Esse estudo abre caminho para evidenciar a importância da temática da liderança e sua interface com a inovação para os profissionais da área de gestão, favorecendo a tomada de decisão, além de contribuir com a literatura, aprofundando o debate sobre o tema liderança e inovação, que ainda é incipiente e necessita de desenvolvimento.

Palavras-chave - Liderança; Inovação; Processo de Tomada de Decisão; Fuzzy AHP; Inovação Gerencial.

1 INTRODUCTION

Whoever is leading an organization, guiding it to the results, makes a total difference. Moreover, in order to achieve satisfactory results, constant updating is necessary to attract consumers and generate competitiveness (Lin & Sun, 2018). Thus, two aspects are important, the leader and innovation together can generate effective benefits.

Regarding innovation, over the last few years, it is referred to as essential in a constantly changing market. In a quick Google search, there are over 30 million results. This number increases further when searching for innovation, where the result rises to 526 million. This information alone does not show the true meaning of innovation, but the importance that is being given to it.

For Griffith, Baur and Buckley (2018), leadership is critical in the workplace as it plays an important role in employee engagement. Zhu, Song, Zhu and Johnson (2019) and Stiles, Ryan and Golightly (2018) explained that, with committed employees, tasks and objectives are achieved in a pleasurable way, where individuals are part of the results. In addition, leadership provides more dialogue and conversations of different opinions, favoring an environment of ideas conducive to innovation. Baumgratz, Teixeira, Werlang, Flach and Favretto (2017) verified, in their studies, that leadership is one of the dimensions of organizational innovation, being highlighted by managers for generation of innovation within the studied company. Baraldi, Vasconcellos, Serio, Pereira and Prim (2017) stated that innovation is related to how the organization is managed and to the management of external and internal elements necessary for it to take place.

Thus, some authors emphasize that leadership can enhance innovation within organizations (Hughes, Lee, Tian, Newman, & Legood, 2018; Melo & Silva, 2019; Juhro, Aulia, Hadiwaluyo, Aliandrina, & Lavika, 2020). Melo and Silva (2019) identified 10 essential qualities related to leadership that can strengthen innovation in the organization. Leaders must be competent, communicative, persuasive, participatory, charismatic, committed, rewarding, directive (know how to guide), visionary and empathetic. In addition, it was found that the qualities of innovative leaders are related to their human skills as leaders, thus, the way in which these leaders relate to members of the

organization. In light of this, we can see the importance of leadership to strengthen innovation in the organization, especially those focused on technology, which need to be constantly updated to remain in the market and have good results.

About the existing relationship and the results provided by leadership associated with innovation within an organization, the present study aimed to develop a model in order to list the priorities related to leadership and its interface with innovation, under the top management perspective of a telecommunications company. For this, the Fuzzy Analytic Hierarchy Process (Fuzzy-AHP) method was used to identify the most prioritized criteria and alternatives, in order to make consistent decisions.

Regarding practical and theoretical justification, this research opens the way to highlight the importance of the theme of leadership and its interface with innovation for professionals in the management area, favoring knowledge about innovation and facilitating the creation of strategies and decision-making, based on the company's analysis. In addition, this study corroborates the literature, deepening the debate on the theme of leadership and innovation, which is still incipient and needs development. As highlighted by authors such as Juhro and Aulia (2018), Hughes *et al*. (2018), Melo and Silva (2019) and Juhro *et al*. (2020), the empowerment of leadership in organizations can influence the development of innovation and, consequently, provide positive results, such as the generation of ideas, improvements in the organization's processes, products or services.

2 THEORETICAL FRAMEWORK

In this section we present the considerations reported in the literature on leadership and innovation, in the sense that these concepts are essential when related to each other. Thus, the following is discussed about leadership and its interface with innovation.

2.1 Leadership and its interface with innovation

Leadership has been singled out as a decisive factor in organizations facing their goal of influencing people in pursuit of a purpose (Steffens *et al.,* 2018). Hristov, Scott and Minocha (2018) already emphasized, in their studies, the fundamental role of the leader in inspiring his collaborators to work, in order to assure organization competitiveness in the increasingly disputed market.

According to Drzewiecka and Roczniewska (2018), in leading, it is essential to know people's motivations and needs, because each of them has different desires, emotions and reactions. Griffith, Baur and Buckley (2018) added different motives that can affect the performance and behavior of subordinates, such as how the leader works, thus, the relationship between the leader and his subordinates is decisive.

For Pilkienė, Alonderienė, Chmieliauskas, Šimkonis and Müller (2018), in the sense that the behavior of leaders affects the way in which the leaders work, three types of leadership were created between the decades of 50 and 60: autocratic leadership, liberal leadership and democratic leadership. These forms of leadership were grouped and conceptualized in Chart 1.

Forms	Description
Autocratic Leadership	The tasks are formalized and structured by the leaders, do not have the participation of the group and the control is rigid.
Liberal Leadership	Leaders abstain from their role and give employees more freedom where they make more decisions.
Democratic Leadership	Acceptance is built through participation and action, with more communication between leader and leader.

Chart 1. Forms of leadership and their concept
Source: Joo, Yu and Atwater (2018); Pilkienė *et al*. (2018).

Based on Chart 1, democratic and liberal leadership styles offer an environment in which the leaders have participation in the decisions and greater freedom to propose ideas to improve the organization. Conversely, in the autocratic leadership, the boss does not present freedom to collaborators. The role of the leader and his/her leadership can influence the culture and the way in which the company seeks to achieve results and consequently, innovation.

It should be noted that the literature on leadership is vast and different theories have been created. Thus, in addition to the forms of leadership highlighted above, some authors suggest approaches to characterize it, called behavioral, contingency, transformational, authentic, psychodynamic leadership, among others (Northouse, 2004). On the other hand, transformational leadership will be highlighted in this study, as it has been related to innovation. Transformational leadership is a kind of participatory leadership, considered adequate in this current context, where the complexity of remaining in the market and constant changes prevail in organizations. Thus, a transformational leader, characterized as participative, flexible, adaptable, close to his team, renewing his vision and strategies, is essential to achieve goals and survive in the competitive environment (Juhro & Aulia, 2018; Juhro & Aulia, 2019; Juhro *et al*., 2020).

Regarding innovation, according to Silva and Burger (2018), it has a fundamental role based on new knowledge and new markets that can be reached to achieve better performance. This is because it is essential, according to Zhu and Cheung, (2017), that companies seek to differentiate themselves to reach more customers, that is, deliver products with added value and that satisfy their needs. In this perspective, Pei (2017) stated, through a hypothesis, that team creativity is totally related to how leadership is structured. Thus, leaders are vital for innovation to occur and develop within the organization. Geraghty and Paterson-Brown (2018) emphasized that innovations need to be managed to achieve success. Companies need to think about strategies, involving the development and implementation of innovations, in order to achieve or maintain a competitive advantage.

In this sense, the authors emphasize that leadership can enhance innovation within organizations, as well as highlight characteristics that can be developed or improved by leaders to create an innovative environment (Khalili, 2016; Juhro & Aulia, 2018; Hughes *et al*., 2018; Melo & Silva, 2019; Zuraik & Kelly, 2019; Juhro *et al*., 2020). Thus, it can be said that leadership promotes an innovative environment in organizations, as shown in Figure 1.

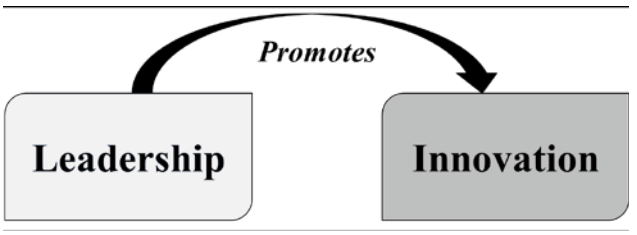

Figure 1. Leadership promotes innovation
Source: Elaborated by the authors.

In addition to improving individuals' personal characteristics, such as competence, communication, persuasion, commitment, vision, empathy (Melo & Silva, 2019), other authors, such as Machado and Carvalho (2013) and Parolin (2013), point out other factors that can influence or are related to organizational innovation, such as training, innovation-focused culture, governance, prospecting for innovation, innovation projects, innovation technology. In addition, other strategies that can contribute to organizational innovation are: acquisition of intangible technology, acquisition of other external knowledge, systemic vision among all company employees, benefits associated with the environment and flexible management. These factors are conceptualized in Chart 2 below.

Factors	Concept
Training	Support employees to develop activities with autonomy (Santos & Silva, 2015; Bilanakos, Heywood, Sessions, & Theodoropoulos, 2018).
Culture of innovation	Provide an environment where employees are encouraged to innovate (Wolf, 2015).
Governance	It is the way in which the organization is directed, supervised and stimulated, involving the relationships between partners, board, supervisory bodies and other interested parties (Molen, 2018).
Prospecting for innovation	It is the ability to generate and seek innovations in desired directions, using the company's strategy for structuring the future (Fernandes, Lima, Silva, Tenório, & Ghesti, 2018).
Innovation projects	Creation of an organizational environment with the objective of detecting new opportunities, ideas and news in order to put them into practice (Scherer, 2017).
Innovation technology	News in the productive sector focused on new technologies or improvement of something already existing (Scherer & Piveta, 2017).
Acquisition of intangible technology	Acquisition of technology in the form of patents, licenses, know-how and services of general technological content (Machado & Carvalho, 2013).
Acquisition of other external knowledge	Technology transfer agreements originated from the purchase of license rights for exploitation of patents and trademarks, acquisition of know-how and other technical-scientific knowledge of third parties, so that the company creates innovations (Machado & Carvalho, 2013).
Systemic view among all company employees	Ability to analyze the whole and the constant changes and changes (Parolin, 2013).
Benefits associated with the environment	Health, safety at work, norms and regulations (Parolin, 2013).
Flexible management	Its objective is to direct its efforts towards the management of people and the permanent process of investments in technologies (Parolin, 2013).

Chart 2. Factors related to organizational innovation
Source: Elaborated by the authors.

Based on these factors from the literature, this study sought to analyze a telecommunications company regarding the relation between leadership and innovation, using a method that lists the priorities through individual's opinion, in this case, the manager and the director of the company. Thus, we present an overview to the company about its leadership and innovation, in order to understand how it is positioned in the market, facilitating the creation of efficient strategies to generate more results and make assertive decisions. Therefore, the following section describes the methodological procedures outlined to reach the proposed objective.

3 METHODOLOGICAL PROCEDURES

This section presents the methodological procedures used in this study. Therefore, the research characterization and the object of study are detailed, as well as the data analysis procedures carried out in order to achieve the proposed results.

3.1 Characterization of the research and object of study

To understand the link between leadership and organizational innovation, an applied research was carried out, as it contributes to studies on the theme. This research also used the qualitative approach. In the qualitative research, a structured interview was conducted to collect the data, with a Manager and a Director of the Human Resources area of a telecommunications company. At first, it sought to understand the interviewees' understanding of innovation and how their respective leaders were characterized. In addition, using a scale of importance given to already established criteria on leadership and innovation in the company, essential data were collected for further analysis of the Fuzzy-AHP method, as shown in Figure 2.

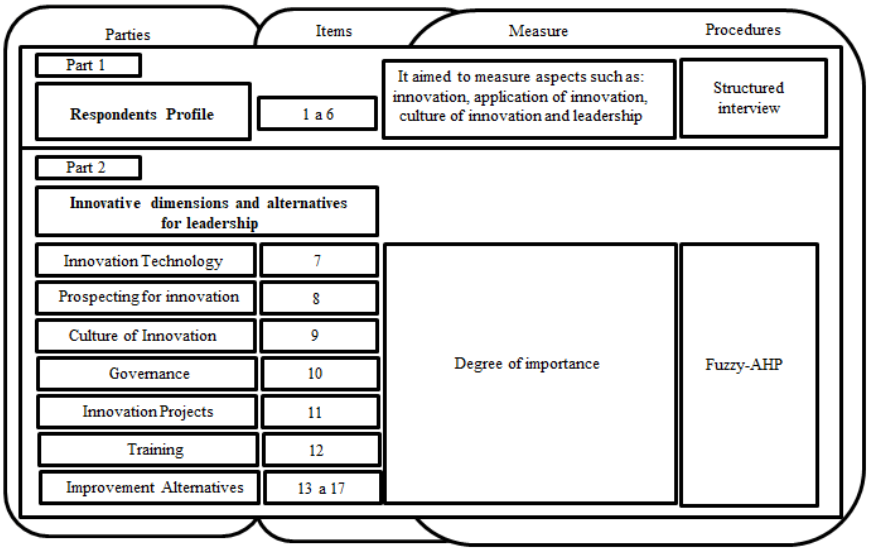

Figure 2. **Representation of the stages developed**
Source: Elaborated by the authors.

Through Figure 2, it is briefly understood how the distribution of the analyzed criteria and alternatives was carried out. The questionnaire was applied in person. The following section describes the method used and the development of the modeling, referring to the presented variables.

3.2 Data analysis procedure

To develop the modeling of this study, the Fuzzy – Analytic Hierarchy Process (Fuzzy-AHP) method was used. Based on Saaty (2008) and Ly, Lai, Hsu and Shih (2018), the hierarchical analysis methodology (AHP) is considered important due to the involvement in the decision-making process and its precision in the solutions for problems in complex environments. The objective of carrying out studies using the AHP technique is to describe the actions that are located in the first, second and third plane that are part of the hierarchy of the decisive process.

To calculate the uncertainty of human preposition, the adjacent fuzzy can be incorporated in the AHP check one by one. The FAHP approach allows a more complete and effective definition of the decision-making process (Wang & Chen, 2008; Kutlu & Ekmekçioğlu, 2012; Radivojević & Gajović, 2014).

It should be remembered that Zadeh (1965) introduced the theory of fuzzy sets, aiming for a rationalization of uncertainty associated with doubt, similar to human thought. The AHP obtained a complement, called fuzzy, elaborated to determine problems of hierarchical imprecision (Stefano, Casarotto Filho, Barichello, & Sohn, 2015; Xie *et al.,* 2018).

The Fuzzy-AHP method focused on defining criteria and alternatives evidenced during the research. The reasons given by Saaty (Saaty, 2008) regarding to the peer-to-peer comparison are taken into account. The sequence of defining criteria and alternatives is in accordance with the elaboration of the structure of the problem exposed in Figure 3.

In order to elaborate the criteria and alternatives, research was conducted on leadership and innovation, in different databases, highlighting Machado and Carvalho (2013) and Parolin (2013). Thus, we selected the main subjects and characteristics that approach leadership and innovation, where they became criteria and alternatives, which specify an environment conducive to innovation in a company. Through the opinion of the manager and director, the priority highlighted for each criterion and alternative was identified.

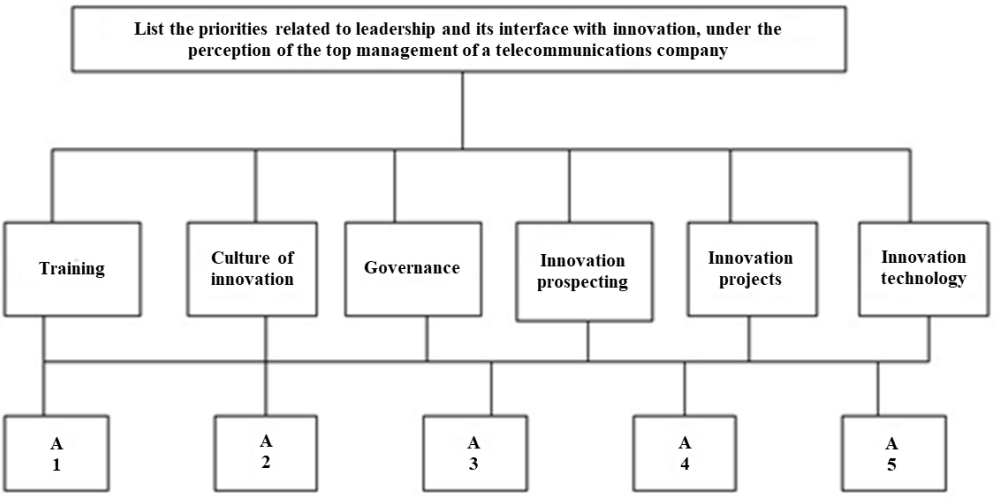

Figure 3. Hierarchical structure of the problem
Source: Elaborated by the authors.

The study presented six criteria, which served as the basis for the choice of five alternatives. In this way, six criteria were developed, aiming to increase the innovation allied with leadership and improving organization performance. The criteria were: (Cr1) Training; (Cr2) Innovation Culture; (Cr3) Governance; (Cr4) Prospecting for innovation; (Cr5) Innovation Projects and (Cr6) Innovation Technology. It is possible to identify the concepts about the criteria in Chart 2.

The evaluation process aimed to choose the best alternative that contributes to increase innovation within the organization (Saaty, 1991). Thus, five alternatives were developed, according to Machado and Carvalho (2013) and Parolin (2013), which aimed to contribute with strategies to increase the performance of the company, the alternatives were: (A1) Acquisition of intangible technology; (A2) Acquisition of other external knowledge; (A3) Systemic view among all employees of

the company; (A4) Benefits associated with the environment and (A5) Flexible management.

To form the uncertainties that exist in the AHP method, the Fuzzy groups are compared in judgment form, generating the Fuzzy-AHP, obtaining a more precise definition in the decision-making (Stefano *et al*., 2015). These comparisons demonstrated the relative relevance of the criteria and alternatives.

After this process, for Saaty (1991), the consistency index (CI) is calculated using the λmax, obtained by: CI = (λmax - n) / (n-1) and, in the formalization, the calculation of the consistency ratio (CR) applied in: CR = CI / RI. The random index (RI) is reached by simulation and synthesized in Table 1, and, in general, an acceptable consistency for n> 4 is CR ≤ 0.10. The random index is established by the number of matrices established by the judge.

N	3	4	5	6	7	8	9	10
RI	0,58	0,9	1,12	1,24	1,32	1,41	1,45	1,49

Table 1. Random index
Source: Saaty (1991).

In this research, we used the Saaty and Shih (2009) scale together with the Fuzzy triangular numbers scale of Somsuk and Laosirihongthong (2014), these being evidenced in Table 2.

Fuzzy triangular scale	Reciprocal Reverse	Definition
(1, 1, 3)	(1/3, 1, 1)	Equal importance.
(1, 3, 5)	(1/5, 1/3, 1)	Weak importance.
(3, 5, 7)	(1/7, 1/5, 1/3)	Slight importance.
(5, 7, 9)	(1/9, 1/7, 1/5)	Moderate importance.
(7, 9, 9)	(1/9, 1/9, 1/7)	Strong importance.

Table 2. Assessment scale of AHP and Fuzzy-AHP
Source: Adapted from Saaty and Shih (2009) and Somsuk and Laosirihongthong (2014).

After defining the scale, the following steps should be carried out Chang (1996):

Step 1: Modification of the original (crisp) values of the original AHP model into triangular fuzzy numbers by comparison with each criteria-alternative pair in the matrix. The operation can be visualized in the following mathematical expression:

$$(M_{g1}^{j})_{n\times n} = \begin{bmatrix} M_{g1}^{1} & M_{g1}^{2} & \cdots & M_{g1}^{m} \\ M_{g2}^{1} & M_{g2}^{2} & \cdots & M_{g2}^{m} \\ \vdots & \vdots & \vdots & \vdots \\ M_{gn}^{1} & M_{gn}^{2} & \cdots & M_{gn}^{m} \end{bmatrix}$$

$$\begin{bmatrix} (1,1,1) & (a_{12},b_{12},c_{12}) & \cdots & (a_{1m},b_{1m},c_{1m}) \\ (a_{21},b_{21},c_{21}) & (1,1,1) & \cdots & (a_{2m},b_{2m},c_{cm}) \\ \vdots & \vdots & \vdots & \vdots \\ (a_{n1},b_{n1},c_{n1}) & (a_{n2},b_{n2},c_{n2}) & \cdots & (1,1,1) \end{bmatrix}$$

Step 2: The value of the synthetic Fuzzy measure in relation to the i[th] object is supported by Equations 1 to 4:

$$S_i = \sum_{j=1}^{m} M_{gi}^{j} \otimes \left[\sum_{i=1}^{n}\sum_{j=1}^{m} M_{gi}^{j}\right]^{-1} \quad (1)$$

$$\sum_{j=1}^{n} M_{ij} = \left(\sum_{j=1}^{n} l_{ij}, \sum_{j=1}^{n} m_{ij}, \sum_{j=1}^{n} u_{ij}\right), i = 1, 2, 3, \ldots, n \quad (2)$$

$$\sum_{i=1}^{m}\sum_{j=1}^{n} M_{gi}^{j} = \left(\sum_{i=1}^{m}\sum_{j=1}^{n} l_{ij}, \sum_{i=1}^{m}\sum_{j=1}^{n} m_{ij}, \sum_{i=1}^{m}\sum_{j=1}^{n} u_{ij}\right) \quad (3)$$

$$\left[\sum_{i=1}^{m}\sum_{j=1}^{n} M_{ij}\right]^{-1} = \left(\frac{1}{\sum_{i=1}^{m}\sum_{j=1}^{n} u_{ij}}, \frac{1}{\sum_{i=1}^{m}\sum_{j=1}^{n} m_{ij}}, \frac{1}{\sum_{i=1}^{m}\sum_{j=1}^{n} l_{ij}}\right) \quad (4)$$

Step 3: The degree of possibility of $M_2 = (l_2, m_2, u_2) \geq M_1 = (l_1, m_1, u_1)$, is established by Equation 5:

$$V\ (M_2 \geq M_1) = sup_{y \geq x}\left[min\left(\mu_{M_2}(x), \mu_{M_2}(y)\right)\right] \quad (5)$$

Also, it may be compatible with Equation 6:

$$V(M_2 \geq M_1) = hgt(M_1 \cap M_2) = \mu_{M_2}(d)$$

$$= \begin{cases} 1, se\ m_2 \geq m_1 \\ 0, se\ l_1 \geq l_2 \\ \dfrac{l_1 - u_2}{(m_2 - u_2) - (m_1 - l_1)}, cc \end{cases} \quad (6)$$

Where d is the order in Figure 4 of the greatest intersection of point D between μ_{M_1} and μ_{M_2}.

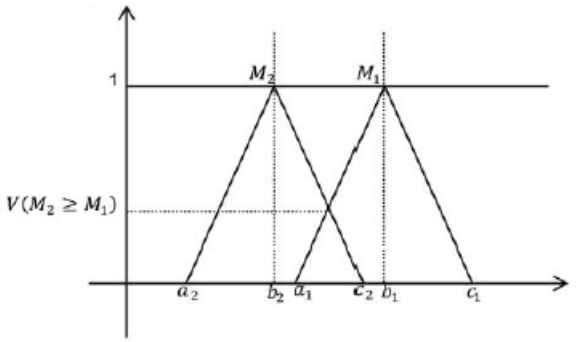

Figure 4. **Intersection between M1 and M2**
Source: Stefano *et al*. (2015).

The formulation of this research was based on the original method by Chang (Chang, 1996), thus, the first and third condition of Equation 7 were used.

Step 4: The degree of possibility of a convex Fuzzy number being greater than k convex Fuzzy numbers $M_i(i = 1,2,3,\dots,k)$ can be defined:

$$V(M \geq M_1, M_2, \dots, M_k) = V[(M \geq M_1)]\ e\ (M \geq M_2)\ e \dots e\ (M \geq M_k) = \min V(M \geq M_i), i = 1, 2, 3, \dots, k \quad (7)$$

Equation 6 takes the form of Equation 8, evaluating the minimum of possibilities:

$$d'^{(A_i)} = \min V(S_j \geq S_i) \quad (8)$$

Step 5: With normalization, the weight vectors are obtained by Equation 9, where W is a non-Fuzzy number.

$$W_i = \frac{w_i'}{\sum_{i=1}^{n} w_i'} \quad (9)$$

Step 6: Thus, we calculated the global weights for the criteria and alternatives, these weights, represented by *w*2, are obtained by multiplying the local weight, which belongs $w_i.w_1$.

With all these results, the global ranking of the alternatives is calculated according to the following equation: $P(An) = \sum_1^n (pCrn) * (pAn)$. Where:

$P(An) =$ Alternative weight of alternative n;
$pCrn =$ Relative importance of criterion n;
$pAn =$ Level of preference of alternative n in relation to criterion n.

For Saaty (2008), the global value of each of the alternatives, as well as their weightings, results in the list of priorities, ordered from the least important, with the objective of assisting the manager in the decision-making process in the face of alternatives present in his daily life. These alternatives aimed to highlight the main medium that leads to greater innovation within the organizational environment. The creation of an action plan for the application of alternatives was created after the FAHP analysis.

4 ANALYSIS AND DISCUSSION OF THE RESULTS

After the study of the theories about the method used, literature review on leadership and innovation, application of the method and organization of the data, we present the discussion about results obtained. Initially, the studied company was highlighted, as a way of better understanding the results.

The studied company is in the field of telecommunications and seeks the provision of services and technological solutions for its public. It has been in the market for more than 7 years and serves four cities located in the state of Rio Grande do Sul: Panambi, Passo Fundo, Vacaria and Palmeira das Missões. Moreover, two partners with more than 22 years of experience in the technology and internet market, who seek to be always bringing new ideas to the company, manage the company unit from which the data was collected.

The governance part of the company is relevant regarding innovation when observing the company's Mission, Vision and Values, relating to the concepts studied previously in the theoretical framework. The company's mission is to "connect people and organizations with excellence". Its vision is to "use the most modern technologies, allied with updated safety concepts, with ethics, creativity, imagination and responsibility", and what moves the company, that is, its values, are described as follows: innovation, enthusiasm, trust, customer focus and commitment

The company offers three Internet plans, between optic fiber and wireless internet, which are recent innovations in the communications field, allowing the user to not need a telephone line to enjoy the broadband services. These plans are offered to both individual and corporate clients. In additoon, on the company's website, SAC is available for customer service via internet. Thus, in the construction of the qualitative phase, one of the managers and one director of the company were interviewed. This provides some essential information to understand how the Manager and the collaborator perceive innovation and leadership.

The company manager has completed higher education and is 38 years old. He seeks to always be attentive and continuously learning about the services that the company offers and the innovations that occur in this branch. The Director of Human Resources is 25 years old and is attending higher education. He has been in the company for 2 years and is a collaborator who knows all areas and sometimes performs other activities to help the organization. To understand the Manager's and Director's perception of leadership and innovation, Chart 3 was elaborated, in which the guiding questions and the opinions of the two interviewees are presented.

Discussion	Manager	Director
What is innovation?	A method that makes it possible to improve the way services are offered and executed, more efficiently and effectively.	They are the new products or services for the market, as a differential of the competition.
What is new in the company?	New services.	New services and customer support.
What innovation applications exist in the company?	New ways of customer service.	Hours of service and differentiated services.
Is there a culture of innovation in the company? If yes, how?	Incentives for employees to bring new ideas to the company with bonuses, awards for them.	Employees are encouraged to bring in new things, to propose innovations for high management of the company.
How is innovation passed on to employees?	Providing autonomy to innovate in the way to accomplish the tasks.	Having the freedom to bring in new things and implement them, reinventing the way you do the chores.
How do you characterize your leadership?	Democratic	Servitor.

Chart 3. Opinion of the Manager and Director regarding some aspects
Source: Elaborated by the authors.

It is possible to verify that, in general, both the Manager's and the Director's opinions are similar, differing mainly in the way leadership is performed, where the Manager is more democratic, according to Joo, Yu and Atwater (2018), stressing that he rewards his employees when they meet the objectives and, frequently, the salary is increased. The Director leads in a servant way, assisting all areas of the organization.

4.1 Comparison between peers and local priorities (PMLs) through the Manager's perception

In the parity judgment of the criteria and alternatives of evaluation, the Saaty Scale was used, in which the Manager establishes value judgments, as detailed in Table 2. The weighting of the criteria occurred through the importance of the peers, aiming to understand the innovation and leadership developed by the organization.

After comparing the pairs, an index called relative importance emerges as the result. It is observed, in Table 3, that the criterion (Cr1) "Training" is more important according to the perspective of the Company Manager, in which it presents 0.3279. This criterion is related to the support given to employees, through training, which aims to increase knowledge and skills on the performed tasks (Tamm, 2018). Next, it is the criterion "Governance" (Cr3), with 0.2513, and "Technology of innovation" (Cr 6), with 0.1769. According to the studies by Felin and Zenger (2014), Hagedoorn and Zobel (2015) and Burger and Fiates (2020), organizations that aim at innovation management present a governance that directs their efforts towards the development of innovative activities. Innovation technologies, on the other hand, directly contribute to the effectiveness, quality, efficiency and safety of the actions developed. in addition to creating favorable conditions for employees (Oliveira Salvador, Oliveira, Costa, Santos, & Tourinho, 2012).

It is worth mentioning that criteria such as innovation culture, prospecting for innovation and innovation projects are of little importance, according to the judgment of the Manager. This means that the studied company does not have these issues internalized, not putting them into practice. Thus, even if the company values innovation, seen from its mission and vision, as well as the conducted interview, many activities are not carried out so that this is sought by all and apprears as one of the objectives to be fulfilled.

The Industrial Revolution 4.0, arising from technological advances, presents challenges for organizations, while the connection, speed of information and availability of data are positive changes, the individualism in sharing, status and power can cause harm and create problems. Thus, a leader who helps their organization to survive these challenges and changes, as well as achieve goals, becomes highly demanded. To this end, the authors emphasize that transformational leadership is considered adequate for this more complex era, as it is characterized as a more participative leadership, where leaders and collaborators are moving towards a shared mission. Thus, leaders need to develop some skills, such as being more flexible, adaptable, working on their emotional and social intelligence, improving their ability to communicate and influence, in addition to solving problems and making decisions (Juhro & Aulia, 2018; Juhro *et al*., 2020). Khalili (2016) also proposes to invest in training for leadership development, if the company's objective is to create an innovative and creative environment for its employees.

Eckert (2017) points out that, in a survey conducted with managers, it presented innovation as the main priority in organizations, surpassing concerns with employees, competitiveness, customers or technological capacity. Eckert also points out that, after 20 years working in Silicon Valley, he can say that collaboration is a determining factor in encouraging innovation. In an innovation process, collaboration between coworkers allows new and radical ideas to be created and makes these innovators think "outside the box", as a single, stuck and undeveloped thought may not generate results.

With this, managers can combine leadership with innovation, obtaining growth and development for their organizations. In particular, the studied company has the capacity to create strategies in order to improve its leadership in favor of innovation, developing the presented characteristics.

	Cr_1	Cr_2	Cr_3	Cr_4	Cr_5	Cr_6	PMLs
Cr_1	(1; 1; 3)	(5; 7; 9)	(1; 3; 5)	(3; 5; 7)	(3; 5; 7)	(3; 5; 7)	**0,3279**
Cr_2	(1/9; 1/7; 1/5)	(1; 1; 3)	(1/7; 1/5; 1/3)	(1/5; 1/3; 1)	(1/5; 1/3; 1)	(1/5; 1/3; 1)	0,0219
Cr_3	(1/5; 1/3; 1)	(3; 5; 7)	(1; 1; 3)	(3; 5; 7)	(3; 5; 7)	(1; 3; 5)	0,2513
Cr_4	(1/7;1/5; 1/3)	(1; 3; 5)	(1/7; 1/5; 1/3)	(1; 1; 3)	(1; 1; 3)	(1/5; 1/3; 1)	0,1110
Cr_5	(1/7;1/5; 1/3)	(1; 3; 5)	(1/7; 1/5; 1/3)	(1; 1; 3)	(1; 1; 3)	(1/5; 1/3; 1)	0,1110
Cr_6	(1/7;1/5; 1/3)	(1; 3; 5)	(1/5; 1/3; 1)	(1; 3; 5)	(1; 3; 5)	(1; 1; 3)	0,1769

Table 3. Weights assigned to the criteria and final prioritization
Source: Elaborated by the authors.

The consistency index (CI) and the consistency ratio (CR) of the criteria were also calculated. The CI presented 0.08141 and the CR presented 0.06565, of the criteria judgment. According to Saaty (2008), for the matrices be adequate and satisfactory, **Erro! Indicador não definido.**e CR values should be less than 0.10, thus observing that it complies with this rule.

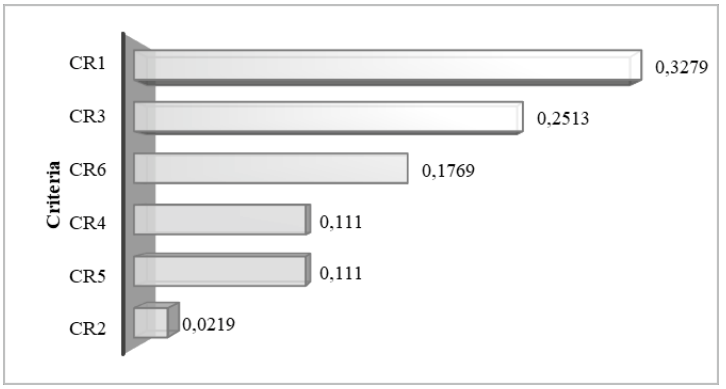

Figure 5. Prioritized criterion
Source: Elaborated by the authors.

The method used in the criteria establishes a preference level of a certain alternative, which is chosen by the Manager. The objective is to identify the alternative that contributes to generating more innovation within the company. Comparisons between the alternatives with the criteria resulted in 6 matrices, as shown in Table 4, in which the priority given to the alternatives can be visualized. General classification of the alternatives was obtained by the weighted sum of the importance indexes, given the level of priority of the mentioned criteria.

Training	A_1	A_2	A_3	A_4	A_5
A_1	(1; 1; 3)	(1; 1; 3)	(1; 3; 5)	(1; 3; 5)	(3; 5; 7)
A_2	(1; 1; 3)	(1; 1; 3)	(1; 3; 5)	(1; 3; 5)	(3; 5; 7)
A_3	(1/5; 1/3; 1)	(1/5; 1/3; 1)	(1; 1; 3)	(1; 3; 5)	(1; 3; 5)
A_4	(1/5; 1/3; 1)	(1/5; 1/3; 1)	(1/5; 1/3; 1)	(1; 1; 3)	(1; 3; 5)
A_5	(1/7; 1/5; 1/3)	(1/7; 1/5; 1/3)	(1/5; 1/3; 1)	(1/5; 1/3; 1)	(1; 1; 3)
Culture of innovation	A_1	A_2	A_3	A_4	A_5
A_1	(1; 1; 3)	(1; 1; 3)	(1; 3; 5)	(1; 3; 5)	(1; 1; 3)
A_2	(1; 1; 3)	(1; 1; 3)	(1; 3; 5)	(1; 3; 5)	(1; 1; 3)
A_3	(1/5; 1/3; 1)	(1/5; 1/3; 1)	(1; 1; 3)	(1; 1; 3)	(1/5; 1/3; 1)
A_4	(1/5; 1/3; 1)	(1/5; 1/3; 1)	(1; 1; 3)	(1; 1; 3)	(1/5; 1/3; 1)
A_5	(1; 1; 3)	(1; 1; 3)	(1; 3; 5)	(1; 3; 5)	(1; 1; 3)
Governance	A_1	A_2	A_3	A_4	A_5
A_1	(1; 1; 3)	(1; 1; 3)	(1; 3; 5)	(1; 3; 5)	(3; 5; 7)
A_2	(1; 1; 3)	(1; 1; 3)	(1; 3; 5)	(1; 3; 5)	(3; 5; 7)
A_3	(1/5; 1/3; 1)	(1/5; 1/3; 1)	(1; 1; 3)	(1; 3; 5)	(1; 3; 5)
A_4	(1/5; 1/3; 1)	(1/5; 1/3; 1)	(1/5; 1/3; 1)	(1; 1; 3)	(1; 3; 5)
A_5	(1/7; 1/5; 1/3)	(1/7; 1/5; 1/3)	(1/5; 1/3; 1)	(1/5; 1/3; 1)	(1; 1; 3)
Prospecting for innovation	A_1	A_2	A_3	A_4	A_5
A_1	(1; 1; 3)	(1; 1; 3)	(1; 3; 5)	(1; 3; 5)	(1; 3; 5)
A_2	(1; 1; 3)	(1; 1; 3)	(1; 3; 5)	(1; 3; 5)	(1; 3; 5)
A_3	(1/5; 1/3; 1)	(1/5; 1/3; 1)	(1; 1; 3)	(1; 1; 3)	(1/5; 1/3; 1)
A_4	(1/5; 1/3; 1)	(1/5; 1/3; 1)	(1; 1; 3)	(1; 1; 3)	(1/5; 1/3; 1)
A_5	(1/5; 1/3; 1)	(1/5; 1/3; 1)	(1; 3; 5)	(1; 3; 5)	(1; 1; 3)
Innovation Projects	A_1	A_2	A_3	A_4	A_5
A_1	(1; 1; 3)	(1; 1; 3)	(1; 3; 5)	(1; 3; 5)	(1; 3; 5)
A_2	(1; 1; 3)	(1; 1; 3)	(1; 3; 5)	(1; 3; 5)	(1; 3; 5)
A_3	(1/5; 1/3; 1)	(1/5; 1/3; 1)	(1; 1; 3)	(1; 1; 3)	(1/5; 1/3; 1)
A_4	(1/5; 1/3; 1)	(1/5; 1/3; 1)	(1; 1; 3)	(1; 1; 3)	(1/5; 1/3; 1)
A_5	(1/5; 1/3; 1)	(1/5; 1/3; 1)	(1; 3; 5)	(1; 3; 5)	(1; 1; 3)
Innovation Technology	A_1	A_2	A_3	A_4	A_5
A_1	(1; 1; 3)	(1; 1; 3)	(1; 3; 5)	(3; 5; 7)	(3; 5; 7)
A_2	(1; 1; 3)	(1; 1; 3)	(1; 3; 5)	(3; 5; 7)	(3; 5; 7)
A_3	(1/5; 1/3; 1)	(1/5; 1/3; 1)	(1; 1; 3)	(1; 3; 5)	(1; 3; 5)
A_4	(1/7; 1/5; 1/3)	(1/7; 1/5; 1/3)	(1/5; 1/3; 1)	(1; 1; 3)	(1; 1; 3)
A_5	(1/7; 1/5; 1/3)	(1/7; 1/5; 1/3)	(1/5; 1/3; 1)	(1; 1; 3)	(1; 1; 3)

Table 4. Evaluation of the alternatives along with the criteria
Source: Elaborated by the authors.

The general organization of each alternative was obtained from the weighted sum of the relative importance indixes and the level of preference given to the criteria. The evaluation of the data related to the alternatives highlights the qualification criterion that presented CI 0.04110 and CR 0.03670. For the other alternatives, the judgment presented CI = 0.0000 and CR = 0.0000. Thus, as a general rule, if the consistency index is less than 0.10, then there is consistency.

	Cr_1	**Cr_2**	**Cr_3**	**Cr_4**	**Cr_5**	**Cr_6**
A_1	0,2795	0,2510	0,2795	0,2623	0,2623	0,3201
A_2	0,2795	0,2510	0,2795	0,2623	0,2623	0,3201
A_3	0,1422	0,0774	0,1422	0,0718	0,0718	0,1129
A_4	0,1900	0,1696	0,1900	0,1706	0,1706	0,1235
A_5	0,1088	0,2510	0,1088	0,2329	0,2329	0,1235

Table 5. Weight of each alternative related to the criteria
Source: Elaborated by the authors.

In addition, it was possible to highlight that, through the FAHP method, the most prioritized alternative by the Manager was A1 (acquisition of intangible technology), representing 0.3518 of preference. Acquisition of intangible technology refers to the acquisition of technologies through patents, among other services of general technological content (Parolin, 2013). For Perez and Famá (2006), scholars have affirmed the relationship between the generation of wealth and intangible assets, which present superior economic results and generation of value for shareholders. This demonstrated how important it is to acquire them for better organizational performance.

Next, the priority is on alternative A2 (0.3064), regarding the acquisition of other external knowledge, for the company to develop or create innovations. In the study by Benedetti, Ghobril and Albarello (2017), the main results highlight the importance of reliable relationships between company managers and external sources of knowledge for the generation of innovations or improvements in processes. On the other hand, the least prominent alternative, with 0.0984, was A3, referring to the systemic vision of all the organization's employees. However, this aspect is highlighted by some authors as important, especially in companies in the technological field. The systemic view, that is, the visualization of the whole and its relationships and connections, is one of the characteristics that can be present in the organization and must be constantly improved (Machado Neto *et al*., 2017; Bortoluzzi, Genari, & Macke, 2018; Meurer & Voese, 2020).

	A_1	A_2	A_3	A_4	A_5	PMLs
A_1	(1; 1; 3)	(1; 3; 5)	(1; 3; 5)	(3; 5; 7)	(3; 5; 7)	**0,3518**
A_2	(1/5; 1/3; 1)	(1; 1; 3)	(1; 3; 5)	(3; 5; 7)	(3; 5; 7)	0,3064
A_3	(1/5; 1/3; 1)	(1/5; 1/3; 1)	(1; 1; 3)	(1; 3; 5)	(1; 3; 5)	0,0984
A_4	(1/7;1/5; 1/3)	(1/7;1/5; 1/3)	(1/5; 1/3; 1)	(1; 1; 3)	(1; 1; 3)	0,1217
A_5	(1/7;1/5; 1/3)	(1/7;1/5; 1/3)	(1/5; 1/3; 1)	(1; 1; 3)	(1; 1; 3)	0,1217

Table 6. Alternatives in order of priority
Source: Elaborated by the authors.

In addition, it should be noted that the consistency index was 0.0719. The consistency ratio of the alternatives was also calculated, being 0.0642, taking into account the constraints imposed by the model. Then, the perception of the director of the studied company is presented.

4.2 Comparison between peers and local priorities (PMLs) through the perception of the Director of Human Resources

After judging the criteria and alternatives of the Company Manager, the data collected from the Director was also analyzed. Thus, it is possible to understand the relationship or disparity that exists between the Manager's and the Director's conception of leadership and innovation.

In Table 7, it was verified that the criterion Cr1 (Training) and Cr2 (Innovation Culture) are more important according to the perspective of the company's Human Resources Director, with 0.2476 of representation. Cr1 (Training) is also cited in greater importance by the Company Manager, differing only on Cr2 (Innovation Culture), which is quoted with the same degree of representation by the Director. The culture of innovation is related to how organization works and pursues its objectives, since they impact on, influence and shape the whole organizational life. They are, therefore, essential and should be taken into account.

Next, there is Criterion Cr6 (Innovation Technology) and Cr3 (Governance) mentioned with medium importance by the Company's Director. The other criteria have a lower degree of representation, thus not being applied by the company, such as Cr4 (Prospecting and Innovation Projects).

	Cr_1	Cr_2	Cr_3	Cr_4	Cr_5	Cr_6	PMLs
Cr_1	(1; 1; 3)	(1; 1; 3)	(1; 3; 5)	(3; 5; 7)	(5; 7; 9)	(1; 3; 5)	**0,2476**
Cr_2	(1; 1; 3)	(1; 1; 3)	(1; 3; 5)	(3; 5; 7)	(5; 7; 9)	(1; 3; 5)	**0,2476**
Cr_3	(1/5; 1/3; 1)	(1/5; 1/3; 1)	(1; 1; 3)	(1; 3; 5)	(3; 5; 7)	(1/5; 1/3; 1)	0,1750
Cr_4	(1/7;1/5; 1/3)	(1/7;1/5; 1/3)	(1/5; 1/3; 1)	(1; 1; 3)	(1; 3; 5)	(1/5; 1/3; 1)	0,1074
Cr_5	(1/9;1/7; 1/5)	(1/9;1/7; 1/5)	(1/7; 1/5; 1/3)	(1/5; 1/3; 1)	(1; 1; 3)	(1/7; 1/5; 1/3)	0,0221
Cr_6	(1/5; 1/3; 1)	(1/5; 1/3; 1)	(1; 3; 5)	(1; 3; 5)	(3; 5; 7)	(1; 1; 3)	0,2003

Table 7. Weights assigned to the criteria and final prioritization
Source: Elaborated by the authors.

The consistency index (CI) and consistency ratio (CR) of the criteria were also calculated. CI presented 0.05064 and CR presented 0.04084, through criteria judgment. According to Saaty's theory, for matrices to be adequate and satisfactory, CR values need to be less than 0.10, observing that it follows this rule.

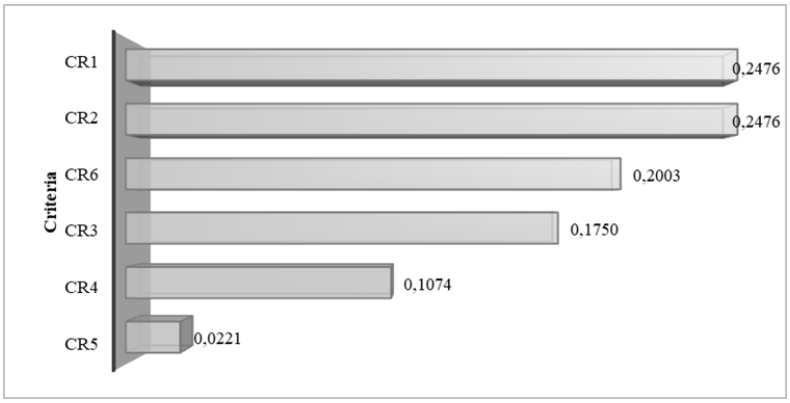

Figure 6. Prioritized criteria
Source: Elaborated by the authors.

As mentioned previously, the method used in the criteria establishes a preference level of a given alternative, which is chosen by the Manager. With this, it identifies the alternative that contributes to generate more innovation within the company. The comparisons between the alternatives and the criteria resulted in 6 matrices, according to Table 8, where the priority given to the alternatives is presented. The general classification of the alternatives was obtained by the weighted sum of the importance indexes, through the priority level of the mentioned criteria.

Training	A_1	A_2	A_3	A_4	A_5
A_1	(1; 1; 3)	(1; 1; 3)	(1; 3; 5)	(1; 3; 5)	(1; 3; 5)
A_2	(1; 1; 3)	(1; 1; 3)	(1; 3; 5)	(1; 3; 5)	(1; 3; 5)
A_3	(1/5; 1/3; 1)	(1/5; 1/3; 1)	(1; 1; 3)	(1; 1; 3)	(1; 1; 3)
A_4	(1/5; 1/3; 1)	(1/5; 1/3; 1)	(1; 1; 3)	(1; 1; 3)	(1; 1; 3)
A_5	(1/5; 1/3; 1)	(1/5; 1/3; 1)	(1; 1; 3)	(1; 1; 3)	(1; 1; 3)
Culture of innovation	A_1	A_2	A_3	A_4	A_5
A_1	(1; 1; 3)	(1; 1; 3)	(1; 3; 5)	(1; 3; 5)	(1; 3; 5)
A_2	(1; 1; 3)	(1; 1; 3)	(1; 3; 5)	(1; 3; 5)	(1; 3; 5)
A_3	(1/5; 1/3; 1)	(1/5; 1/3; 1)	(1; 1; 3)	(1; 1; 3)	(1; 1; 3)
A_4	(1/5; 1/3; 1)	(1/5; 1/3; 1)	(1; 1; 3)	(1; 1; 3)	(1; 1; 3)
A_5	(1/5; 1/3; 1)	(1/5; 1/3; 1)	(1; 1; 3)	(1; 1; 3)	(1; 1; 3)
Governance	A_1	A_2	A_3	A_4	A_5
A_1	(1; 1; 3)	(1; 1; 3)	(1; 1; 3)	(1; 3; 5)	(1; 1; 3)
A_2	(1; 1; 3)	(1; 1; 3)	(1; 1; 3)	(1; 3; 5)	(1; 1; 3)
A_3	(1; 1; 3)	(1; 1; 3)	(1; 1; 3)	(1; 3; 5)	(1; 1; 3)
A_4	(1/5; 1/3; 1)	(1/5; 1/3; 1)	(1/5; 1/3; 1)	(1; 1; 3)	(1/5; 1/3; 1)
A_5	(1; 1; 3)	(1; 1; 3)	(1; 1; 3)	(1; 3; 5)	(1; 1; 3)
Prospecting for innovation	A_1	A_2	A_3	A_4	A_5
A_1	(1; 1; 3)	(1; 1; 3)	(1/5; 1/3; 1)	(1/5; 1/3; 1)	(1/5; 1/3; 1)
A_2	(1; 1; 3)	(1; 1; 3)	(1/5; 1/3; 1)	(1/5; 1/3; 1)	(1/5; 1/3; 1)
A_3	(1; 3; 5)	(1; 3; 5)	(1; 1; 3)	(1; 3; 5)	(1; 1; 3)
A_4	(1; 3; 5)	(1; 3; 5)	(1/5; 1/3; 1)	(1; 1; 3)	(1/5; 1/3; 1)
A_5	(1; 3; 5)	(1; 3; 5)	(1; 1; 3)	(1; 3; 5)	(1; 1; 3)
Innovation Projects	A_1	A_2	A_3	A_4	A_5
A1	(1; 1; 3)	(1; 1; 3)	(1/7; 1/5; 1/3)	(1/5; 1/3; 1)	(1/7; 1/5; 1/3)
A2	(1; 1; 3)	(1; 1; 3)	(1/7; 1/5; 1/3)	(1/5; 1/3; 1)	(1/7; 1/5; 1/3)
A3	(3; 5; 7)	(3; 5; 7)	(1; 1; 3)	(1; 3; 5)	(1; 1; 3)
A4	(1; 3; 5)	(1; 3; 5)	(1/5; 1/3; 1)	(1; 1; 3)	(1/5; 1/3; 1)
A5	(3; 5; 7)	(3; 5; 7)	(1; 1; 3)	(1; 3; 5)	(1; 1; 3)
Innovation Technology	A_1	A_2	A_3	A_4	A_5
A_1	(1; 1; 3)	(1; 1; 3)	(1; 3; 5)	(1; 3; 5)	(1; 3; 5)
A_2	(1; 1; 3)	(1; 1; 3)	(1; 3; 5)	(1; 3; 5)	(1; 3; 5)
A_3	(1/5; 1/3; 1)	(1/5; 1/3; 1)	(1; 1; 3)	(1; 1; 3)	(1; 1; 3)
A_4	(1/5; 1/3; 1)	(1/5; 1/3; 1)	(1; 1; 3)	(1; 1; 3)	(1; 1; 3)
A_5	(1/5; 1/3; 1)	(1/5; 1/3; 1)	(1; 1; 3)	(1; 1; 3)	(1; 1; 3)

Table 8. Evaluation of the alternatives together with the criteria
Source: Elaborated by the authors.

The general prioritization of each alternative was obtained with the weighted sum of the relative importance indixes and the level of preference given to the criteria. With the evaluation of the data related to the alternatives, it is highlighted that training and innovation culture criterion presented CI 0,00 and CR 0,00. Thus, as a general rule, if the consistency index is less than 0.10, then there is consistency.

	Cr_1	Cr_2	Cr_3	Cr_4	Cr_5	Cr_6
A_1	**0,2727**	**0,2727**	**0,2276**	**0,1642**	**0,1199**	**0,2727**
A_2	**0,2727**	**0,2727**	**0,2276**	**0,1642**	**0,1199**	**0,2727**
A_3	0,0823	0,0823	0,1753	0,1950	0,2231	0,0823
A_4	0,1862	0,1862	0,1419	0,2241	0,2264	0,1862
A_5	0,1862	0,1862	0,2276	0,2525	0,3107	0,1862

Table 9. Weight of each alternative related to the criteria
Source: Elaborated by the authors.

Through the FAHP method, the alternative that was most prioritized by the Director was A1 (acquisition of intangible technology) and A2 (acquisition of other external knowledge), representing 0.2727 of preference. Regarding innovation, the Company's Director has prioritized variables that directly impact on its development, according to the studied authors.

Both the Manager's and the Director's alternatives were similar. Thus, it is noted that the management mentality of the two are similar. Carnevale, Huang, Crede, Harms and Uhl-Bien (2017) argue that the creation of a bond between the leader and their employees, in this case manager and director, results in more innovative behaviors, through their interactions and common goals. On the other hand, it is important that both manager and director seek to highlight, in the company, other factors that were not mentioned with as much importance, such as having a systemic view and flexible management, which can contribute to greater innovation.

	A_1	A_2	A_3	A_4	A_5	PMLs
A_1	(1; 1; 3)	(1; 1; 3)	(1; 3; 5)	(3; 5; 7)	(5; 7; 9)	**0,2429**
A_2	(1; 1; 3)	(1; 1; 3)	(1; 3; 5)	(3; 5; 7)	(5; 7; 9)	**0,2429**
A_3	(1/5; 1/3; 1)	(1/5; 1/3; 1)	(1; 1; 3)	(1; 3; 5)	(3; 5; 7)	0,2143
A_4	(1/7;1/5; 1/3)	(1/7;1/5; 1/3)	(1/5; 1/3; 1)	(1; 1; 3)	(1; 3; 5)	0,1946
A_5	(1/9;1/7; 1/5)	(1/9;1/7; 1/5)	(1/7;1/5; 1/3)	(1/5; 1/3; 1)	(1; 1; 3)	0,1052

Table 10. Alternatives in order of priority
Source: Elaborated by the authors.

The consistency index was also calculated, which presented 0.0261, and the consistency ratio of the alternatives was 0.0233, taking into account the constraints imposed by the model. From these findings, one can understand the opinion of the Company's Manager and Director, providing data that helps in the business' decision-making process.

5 CONCLUSIONS

The present study aimed to develop a model in order to list the priorities related to leadership and its interface with innovation, under the perspective of the top management of a telecommunications company. For this, we used the Fuzzy-AHP method in order to prioritize criteria and alternatives through the judgments made by the professionals.

Based on this, when analyzing the variables collected through interviews with the Manager and the Director of the telecommunications company, it was found that the criterion prioritized by the Manager was "Training" and the most important alternative was "Acquisition of intangible technology". It is evidenced the importance that the Manager giver to the training of his collaborators, in order to deliver more results to the company, as well as all the actors involved in it. On the other hand, when analyzing the data of the Director, it was found that the chosen criterion and alternative were the same ones that the Director pointed out as having greater importance.

With this, it is emphasized that the alternatives chosen by the directors are more complex, able to be used in simpler ways that bring greater results, such as having a more systemic view, on the part of all company employees, or even more flexible management that generates a stronger culture of idealizations and innovations. These are more traditional ways that, considering a smaller company located in a small city in the northwest region of the state of Rio Grande do Sul, can make greater differences.

On the other hand, the company focuses its efforts in search of innovation, as seen in the interviews, as well as in the company's mission and vision, thus, the prioritized alternatives, such as "Acquisition of intangible technology" and "Acquisition of external knowledge" favor innovation,

these being positive factors. It is noticed that both Manager and Director have similarities in their answers, favoring the achievement of the objectives, since they are related and aligned in a purpose.

Within this context, it is necessary to highlight that leaders and the way in which they exercise their leadership role are strictly related to the goals, proposed objectives and results obtained by companies. Thus, for innovation to be internalized by all members, the development of leaders, prioritizing certain competencies, such as flexibility, adaptation, emotional intelligence, communication and influence, can create a favorable environment to achieve this important purpose, which is innovation. In addition, training and constant learning must be frequent for managers and directors, seeking to improve their leadership skills.

Therefore, as a suggestion for future studies, we leave the verification in the practice of an organization after using the alternative prioritized by the method, to prove if it has brought results to the organization. As limitations of this research, we emphasize not using the data from other Directors and Employees of the company, to enrich the analysis and results.

REFERENCES

Baraldi, A., Vasconcellos, M. A., Serio, L. C, Pereira, S. M. S., Prim, A. L. (2017). Competências da Organização Inovadora em Empresas da Fundação Nacional da Qualidade. *Revista Brasileira de Gestão e Inovação*, *5*(1), 74-100.

Baumgratz, A., Teixeira, G., Werlang, N. B., Flach, R. O., & Favretto, F. (2017). Inovatividade Organizacional e Desempenho Inovador em Supermercados: Um Estudo de Caso Múltiplo. *Revista Brasileira de Gestão e Inovação*, *5*(2), 107-131.

Benedetti, M. H., Ghobril, A. N., & Albarello, E. B. (2017). Possíveis interações entre conhecimentos externos e internos nos processos de inovações de micro e pequenas empresas. *Revista Capital Científico-Eletrônica*, *15*(3), 90-110.

Bilanakos, C., Heywood, J. S., Sessions, J., & Theodoropoulos, N. (2018). Does demand for product quality increase worker training?. *Journal of Economic Behavior & Organization*, *155*, 159-177.

Bortoluzzi, F. R., Genari, D., & Macke, J. (2018). Capital humano nas organizações intensivas em conhecimento: desafios e perspectivas. *Revista Inteligência Competitiva*, *8*(1), 44-79.

Burger, B. E., & Fiates, G. G. S. (2020). A governança da propriedade intelectual no contexto da inovação aberta. *Revista de Administração Unimep*, *18*(2), 209-235.

Carnevale, J. B., Huang, L., Crede, M., Harms, P., & Uhl-Bien, M. (2017). Leading to stimulate employees' ideas: A quantitative review of leader–member exchange, employee voice, creativity, and innovative behavior. *Applied Psychology*, *66*(4), 517-552.

Chang, D. Y. (1996). Applications of the extent analysis method on fuzzy AHP. *European journal of operational research*, *95*(3), 649-655.

Drzewiecka, M., & Roczniewska, M. (2018). The relationship between perceived leadership styles and organisational constraints: An empirical study in Goleman's typology. *European Review of Applied Psychology*, *68*(4-5), 161-169.

Eckert, V. H. (2017). Collaboration for innovation: Why technology alone isn't enough. *PwC Global*.

Retrieved from https://www.pwc.com/gx/en/ceo-agenda/pwc-at-davos/blogs/2017/collaboration-for-innovation-why-technology-alone-isnt-enough.html

Felin, T., & Zenger, T. R. (2014). Closed or open innovation? Problem solving and the governance choice. *Research policy*, *43*(5), 914-925.

Fernandes, T. L., Lima, L. A., da Silva, M. L., da Silva Tenório, L. X., & Ghesti, G. F. (2018). Prospecção Tecnológica: uma visão das inovações e perspectivas do mercado cervejeiro. *Cadernos de Prospecção*, *11*(2), 580.

Geraghty, A., & Paterson-Brown, S. (2018). *Leadership and working in teams*. Surgery (Oxford).

Griffith, J. A., Baur, J. E., & Buckley, M. R. (2019). Creating comprehensive leadership pipelines: Applying the real options approach to organizational leadership development. *Human Resource Management Review*, *29*(3), 305-315.

Hagedoorn, J., & Zobel, A. K. (2015). The role of contracts and intellectual property rights in open innovation. *Technology Analysis & Strategic Management*, *27*(9), 1050-1067.

Hristov, D., Scott, N., & Minocha, S. (2018). Distributed leadership typologies in destination management organisations. *Tourism management perspectives*, *28*, 126-143.

Hughes, D. J., Lee, A., Tian, A. W., Newman, A., & Legood, A. (2018). Leadership, creativity, and innovation: A critical review and practical recommendations. *The Leadership Quarterly*, *29*(5), 549-569.

Joo, M. K., Yu, G. C., & Atwater, L. (2018). Formal leadership mentoring and motivation to lead in South Korea. *Journal of Vocational Behavior*, *107*, 310-326.

Juhro, S. M., Aulia, A. F., Hadiwaluyo, D., Aliandrina, D., & Lavika, E. (2020). The Role of Catalytic Collaboration in Leveraging Transformational Leadership Competencies to Generate Sustainable Innovation. *International Journal of Organizational Leadership*, *9*(1), 48-66.

_____. (2019). New Sources of Growth: The Role of Frugal Innovation and Transformational Leadership. *Buletin Ekonomi Moneter dan Perbankan*, *22*(3), 383-402.

_____. (2018). Transformational leadership through applied neuroscience: Transmission mechanism of the thinking process. *International Journal of Organizational Leadership, 7*(3), 211-229.

Khalili, A. (2016). Linking transformational leadership, creativity, innovation, and innovation-supportive climate. *Management Decision*, *54*(9), 2277-2293.

Kutlu, A. C., & Ekmekçioğlu, M. (2012). Fuzzy failure modes and effects analysis by using fuzzy TOPSIS-based fuzzy AHP. *Expert Systems with Applications*, *39*(1), 61-67.

Lin, C. H. V., & Sun, J. M. J. (2018). Chinese employees' leadership preferences and the relationship with power distance orientation and core self-evaluation. *Frontiers of Business Research in China*, *12*(1), 6.

Ly, P. T. M., Lai, W. H., Hsu, C. W., & Shih, F. Y. (2018). Fuzzy AHP analysis of Internet of Things (IoT) in enterprises. *Technological Forecasting and Social Change*, *136*, 1-13.

Machado, D. D. P. N., & de Carvalho, L. C. (2013). Ambiente favorável ao desenvolvimento de inovações: proposição de um modelo de análise organizacional. *Revista de Administração*, *48*(3), 592-607.

Machado Neto, A. J. *et al*. (2017). *Visão sistêmica e administração*. Saraiva Educação.

Melo, F. G. O., & Silva, G. (2019). Qualidades de liderança para a inovação em organizações do setor público. *Revista Brasileira de Gestão e Inovação*, *6*(3), 121-143.

Meurer, A. M., & Voese, S. B. (2020). Há vagas: análise do perfil profissional requerido pelo mercado de trabalho para profissionais contábeis da área de custos. *Revista Catarinense da Ciência Contábil*, *19*(1), 1-14.

Northouse, P. G. (2004). *Leadership***:** theory and practice. 3. ed. California: Thousand Oaks.

Oliveira Salvador, P. T. C., Oliveira, R. K. M., da Costa, T. D., Santos, V. E. P., & Tourinho, F. S. V. (2012). Tecnologia e inovação para o cuidado em enfermagem. *Revista Enfermagem UERJ*, *20*(1), 111-117.

Parolin, S. R. H. (2013). Estudo multicasos sobre atividades inovativas. *Revista de Administração*, *48*(3), 608-620.

Pei, G. (2017). Structuring leadership and team creativity: The mediating role of team innovation climate. *Social Behavior and Personality: an international journal*, *45*(3).

Perez, M. M., & Famá, R. (2006). Ativos intangíveis e o desempenho empresarial. *Revista Contabilidade & Finanças*, *17*(40), 7-24.

Pilkienė, M., Alonderienė, R., Chmieliauskas, A., Šimkonis, S., & Müller, R. (2018). The governance of horizontal leadership in projects. *International Journal of Project Management*, *36*(7), 913-924.

Radivojević, G., & Gajović, V. (2014). Supply chain risk modeling by AHP and Fuzzy AHP methods. *Journal of Risk Research*, *17*(3), 337-352.

Saaty, T. L. (1991). Response to Holder's comments on the analytic hierarchy process. *Journal of the Operational Research Society*, *42*(10), 909-914.

_____. (2008). Decision making with the analytic hierarchy process. *International journal of services sciences*, *1*(1), 83-98.

_____, & Shih, H. S. (2009). Structures in decision making: On the subjective geometry of hierarchies and networks. *European Journal of Operational Research*, *199*(3), 867-872.

Santos, R. A., & Silva, L. P. (2015). Princípios e valores organizacionais: a questão do treinamento e a excelência dos serviços hoteleiros. Um estudo de caso na JW Marriott Rio de Janeiro. *Revista Brasileira de Pesquisa em Turismo*, *9*(3), 422-441.

Scherer, F. (2017). *Cinco dicas para executar os melhores projetos de inovação*. Revista Exame. https://exame.com/blog/inovacao-na-pratica/5-dicas-para-executar-melhor-os-projetos-de-inovacao/

Scherer, F. L., & Piveta, M. N. (2017). Ciência, tecnologia e inovação e internacionalização de negócios: estudo bibliométrico nas bases Web of Science e Scopus. *Revista Gestão & Tecnologia*, *17*(4), 152-181.

Silva, T. C., & Burger, F. (2018). Aprendizagem organizacional e inovação: contribuições da Gestão do Conhecimento para propulsionar um ambiente corporativo focado em aprendizagem e inovação. *Navus-Revista de Gestão e Tecnologia*, *8*(1), 07-19.

Somsuk, N., & Laosirihongthong, T. (2014). A fuzzy AHP to prioritize enabling factors for strategic management of university business incubators: Resource-based view. *Technological forecasting and social change*, *85*, 198-210.

Stefano, N. M., Casarotto Filho, N., Barichello, R., & Sohn, A. P. (2015). Hybrid fuzzy methodology for the evaluation of criteria and sub-criteria of product-service system (PSS). *Procedia CIRP*, *30*, 439-444.

Steffens, N. K., Fonseca, M. A., Ryan, M. K., Rink, F. A., Stoker, J. I., & Pieterse, A. N. (2018). How feedback about leadership potential impacts ambition, organizational commitment, and performance. *The Leadership Quarterly*, *29*(6), 637-647.

Stiles, S., Ryan, B., & Golightly, D. (2018). Evaluating atitudes to safety leadership within rail construction projects. *Safety science*, *110*, 134-144.

Tamm, M. (2018). Training and changes in job Tasks. *Economics of Education Review*, *67*, 137-147.

Molen, F. V. D. (2018). How knowledge enables governance: The coproduction of environmental governance capacity. *Environmental science & policy*, *87*, 18-25.

Wang, T. C., & Chen, Y. H. (2008). Applying fuzzy linguistic preference relations to the improvement of consistency of fuzzy AHP. *Information Sciences*, *178*(19), 3755-3765.

Wolf, I. (2015). *As 8 dimensões da gestão da inovação eficiente*. Goiânia.

Xie, Y., Xue, W., Li, L., Wang, A., Chen, Y., Zheng, Q., ... & Li, X. (2018). Leadership style and innovation atmosphere in enterprises: An empirical study. *Technological Forecasting and Social Change*, *135*, 257-265.

Zadeh, L. A. (1965). Fuzzy sets. *Information and control*, *8*(3), 338-353.

Zhu, J., Song, L. J., Zhu, L., & Johnson, R. E. (2019). Visualizing the landscape and evolution of leadership research. *The Leadership Quarterly*, *30*(2), 215-232.

Zhu, L., & Cheung, S. O. (2017). Harvesting competitiveness through building organizational innovation capacity. *Journal of Management in Engineering*, *33*(5).

Zuraik, A., & Kelly, L. (2019). The role of CEO transformational leadership and innovation climate in exploration and exploitation. *European Journal of Innovation Management*, *22*(1), 84-104.

AUTHORS

1. Roger da Silva Wegner
Institution: Universidade Federal de Santa Maria, Santa Maria, Rio Grande do Sul, Brazil
Doctoral student of Administration from Federal University of Santa Maria. Master's degree in production engineering from Federal University of Santa Maria. Graduated of Administration from Federal University of Santa Maria.
E-mail: rswegnerr@gmail.com
ORCID: https://orcid.org/0000-0002-2034-8034

2. Julia Tontini
Institution: Universidade Federal de Santa Maria, Santa Maria, Rio Grande do Sul, Brazil.
Master student of Administration from Federal University of Santa Maria. Graduated of Administration from Federal University of Santa Maria.
E-mail: ju-tontini@hotmail.com
ORCID: https: //orcid.org/0000-0001-8509-8665

3. Vânia Medianeira Flores Costa
Institution: Universidade Federal de Santa Maria, Santa Maria, Rio Grande do Sul, Brazil.
PhD of Administration from Federal University of Bahia. Master's degree in Administration from Federal University of Santa Catarina. Graduated in Administration from Federal University of Santa Maria.
E-mail: vania.costa@ufsm.br
ORCID: https://orcid.org/0000-0002-6099-820X

4. Arthur Muller Junior
Institution: Universidade Federal de Santa Maria, Santa Maria, Rio Grande do Sul, Brazil
Graduating of Administration from Federal University of Santa Maria.
E-mail: arthurmuller58@gmail.com
ORCID: https://orcid.org/0000-0002-9060-0880

5. Deoclécio Junior Cardoso da Silva
Institution: Universidade Federal de Santa Maria, Santa Maria, Rio Grande do Sul, Brazil.
Doctoral student of Administration from Federal University of Santa Maria. Master's degree in production engineering from Federal University of Santa Maria. Graduated of Administration from Integrated Regional University.
E-mail: deocleciojunior2009@hotmail.com
ORCID: https://orcid.org/0000-0002-2395-2878

Contribution of authors

Contribution	[Author 1]	[Author 2]	[Author 3]	[Author 4]	[Author 4]
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)					

Conflict of Interest
The authors have stated that there is no conflict of interest.
Copyrights
ReA/UFSM owns the copyright to this content.
Plagiarism Check
The ReA/UFSM maintains the practice of submitting all documents approved for publication to the plagiarism check, using specific tools, e.g.: CopySpider.