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RESEARCH ARTICLE

Perceptual mapping of the association between IT project success and factors promoting strategic alignment

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Abstract
The present research aimed at investigating the existence of associations between the factors promoting the strategic alignment of Information Technology (IT) and the success of IT projects. IT projects carried out in a public company in the Brazilian electricity sector from 2015 to 2018 were taken as the locus of the study. The research had a descriptive nature, used the quantitative method and a survey with 144 respondents from the company's business and IT areas. The key findings indicate that the success of IT projects depends on both the social dynamics between IT and business teams, as well as the intellectual/strategic alignment of IT plans, resources and priorities with the overall business objectives. This research contributes by providing insights into the aspects of strategic alignment and their influence on project success. It offers practical guidance for organizations in managing IT projects and aligning them with business objectives. While the study focuses on a specific Brazilian public company, further research is needed to validate the findings across different industries and contexts. Overall, this research enhances our understanding of the relationship between strategic alignment, IT project success, and provides a foundation for future studies in this area.

Keywords
IT strategic alignment; project management; success in IT projects.

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1. Introduction

The intense competition in the markets, intrinsically related to constantly changing socio-technical aspects (Van Grembergen & De Haes, 2009), motivated organizations from the 1990s onwards to replace the back-office role assigned to information technology (IT) with a position closer to strategic decisions, where its ability to promote innovation assumes greater relevance (Weiss & Thorogood, 2011). Hence, the search for the development and implementation of organizational strategies based on technological resources, aimed at establishing competitive advantages, has become an ongoing reality (Turban et al., 2010). For Lorences and Ávila (2013), this aspect provided IT with a transversal insertion in the business environment, permeating various intra- and inter-organizational processes and making decisions related to the use of IT more complex.

Such decisions are made based on existing elements within both the business scope and the scope of IT. Therefore, they involve an elaborate negotiation process that considers desires and availability (Jorfi et al., 2011; Cataldo et al., 2012). These decisions must also align with the priorities defined for executing organizational strategies while bearing in mind the achievement of strategic objectives (Garg & Goyal, 2012; Huang, 2012). This effort is referred to as IT strategic alignment (Kearns & Lederer, 2000; Luftman, 2000). For almost thirty years, the concept of strategic alignment of IT with business has been discussed in academic circles. It refers to the decision-making process where business and IT managers collaborate to determine how technology should be utilized in organizations (Coltman et al., 2015). However, the usual definitions attributed to this concept (Ciborra, 1997; Maes et al., 2000), as well as its applicability in organizations (Johnson, 2011; Simons, 2012), have been intensely questioned.

To understand the dynamics of establishing the strategic alignment of IT, several organizational studies (Luftman et al., 1999; Teo & Ang, 1999; Reich & Benbasat, 2000; Burn & Szeto, 2000; Galas & Ponte, 2006), have been dedicated to identifying both promoting and inhibiting factors that permeate strategic decisions involving both business and IT. Such factors play prominent roles in realizing alignment or complicating its establishment. Additionally, other organizational studies (Weiss & Thorogood, 2011; Chiang & Nunez, 2013), propose an approach to strategic alignment of IT based on IT projects conducted by companies. These studies address the apparent lack of research that considers both internal and external dimensions of organizations.

According to Kearns and Sabherwal (2006), business needs and IT skills converge in IT projects to provide value to the organization. As stated by Hacker and Dolen (2007), when IT projects are successful and achieve their goals, they support the strategic alignment of IT, enabling business objectives. Conversely, when projects are unsuccessful and fail to achieve their objectives, evidence suggests that there are problems associated with the strategic alignment of IT. The failure of IT projects results in significant waste of limited financial and human resources, preventing organizations and the public from realizing intended benefits (Schmidt, 2023). According to Weiss and Thorogood (2011), research on IT project management demonstrates that project success is linked to the involvement of top-level managers and the alignment between business and IT plans developed during the planning phase. These elements were also highlighted by Luftman et al. (1999) as factors promoting the strategic alignment of IT.

The existing literature emphasizes the significance of strategic alignment between IT and business in organizations (Adama et al., 2024). While the concept of IT strategic alignment has been discussed for nearly three decades, there remains a need to study elements that link the promotion of alignment and the success of IT projects. In view of this approach, this work seeks to describe perceptions of business and IT managers regarding elements linked to the strategic alignment of IT and the achievement of objectives intended by IT projects. Specifically, it investigates existing associations between factors promoting IT strategic alignment and the success of IT projects. The locus of this research was a set of IT projects carried out in a public company in the Brazilian electricity sector from 2015 to 2018. Operationalization occurred through a survey of managers from both business areas and IT.

This study offers valuable contributions to both practical and academic literature. It fills a research gap by describing factors that promote strategic alignment between IT and business and how they relate to the success in IT projects. By investigating perceptions of business and IT managers, it provides insight into decision-making processes and their impact on project outcomes. This knowledge can guide organizations in making informed decisions about IT utilization and strategic alignment, improving project success rates. Furthermore, this study enhances understanding of relationships between IT strategic alignment and project outcomes, contributing to the existing body of knowledge in this field. The focus on a specific public company within the Brazilian electricity sector provides real-world insights applicable to similar industrial contexts. Overall, this research has practical implications for organizations and contributes to advancing academic understanding of IT strategic alignment.

This paper is structured as follows: Section 2 presents a brief review of the extant literature on IT strategic alignment and project management. It is followed by a description of the research methodology and data collection procedures in Section 3. The results of data analysis are described in Section 4, and related discussions are presented in Section 5. Finally, conclusions are drawn, and implications for future research are discussed in the last section.

2. Background

2.1. IT Strategic Alignment

Several studies relating IT strategy, organizational strategy, and business objectives inhabited the Information Systems (IS) research agenda during the 1990s and 2000s, with the seminal article by Henderson and Venkatraman (1993) being an initial proposition of a conceptual model for the strategic alignment of IT. It is argued that the strategic alignment of IT promotes superior performance for an organization if the key resources of IT, components of the technological infrastructure, technical skills, managerial skills, and knowledge assets are employed in line with the business strategy while being controlled to ensure the effective management of these resources (Coltman et al., 2015). Thus, strategic alignment between IT and business can be understood as a harmonious relationship established over time between IT resources and business objectives or needs (Luftman, 2000). It is also understood as the degree to which the mission, objectives, and IT planning are adherent to the organization's mission, objectives and strategic planning (Reich & Benbasat, 1996).

Through their contributions, a diverse range of works proposed explanations about strategic alignment of IT, which reveals important concepts (Busanelo et al., 2011). From the article by Henderson and Venkatraman (1993), emerges an understanding regarding levelling, in the strategic scope, of business and IT plans through strategic adjustment is absorbed. Likewise, business and IT structures share efforts regarding functional integration. In turn, Reich and Benbasat (1996) present causes and effects related to strategic alignment of IT, mentioning elements arising from the intellectual (planning methodology and control instruments) and social (actors, decision-making and communication) dimensions of the organization. Despite IT project management achieving high levels of success, only a minority of projects are complete without changes in scope, schedule, or cost (Bilir & Yafez, 2021). This reinforces the importance of IT strategic alignment, considering that smaller differences between implemented IT strategies and formulated IT strategies denote a greater effectiveness of the IT area within fulfilling its planning, promoting a better performance of the business area (Chan et al., 1997). Even so, as project size increases, the success rate decreases (Varajão, 2018), which means that in larger projects this importance is amplified.

Additionally, Teo and King (1997) express a contingency perception whereby relationships between environmental and organizational characteristics are established for different degrees of alignment. Hirschheim and Sabherwal (2001) advocate that organizational performance derives from the organization's ability to maintain the link between business and IT strategies, avoiding deviations from IT's strategic alignment. Otherwise, Palvia et al. (2022) show that IT strategic alignment is one of the mechanisms that mediate the impact of IT governance on performance. Similarly, Chau et al.

(2020) indicates that effective IT governance in proactive organizations positively moderated the relationship between IT strategic alignment and firm performance. In the understanding of Brodbeck and Hoppen (2003), the formulation of business and IT plans occurs mutually, constituting the circular alignment. Kearns and Sabherwal (2006) discuss the idea that the level and understanding of top management about the role of IT, results in better business and IT plans, which, in turn, qualify IT project planning, inhibiting problems in the implementation of these projects. Chao and Chandra (2012) support this perspective, highlighting the influence of top management's IT knowledge on the strategic alignment between business and IT.

Although these propositions show practices that seek to achieve the strategic alignment of IT itself (Weiss et al., 2006; Coltman et al., 2015), other authors point out the difficulties in making the concept applicable to organizational reality, questioning the models and frameworks (Johnson, 2011; Simons, 2012). Additionally, the misalignment between business and IT strategies presents a wide range of risks, including management risk, operational malfunctioning of business processes, information security threats, financial risks, and reputational risks to the organization (Mantey, 2022). In parallel, other contributions focused attention on elements capable of determining different behaviors of the strategic alignment of IT, facilitating its establishment or hindering its occurrence (Reich & Benbasat, 2000; Galas & Ponte, 2006). These works had as a starting point the premise adopted from the perspective of critical success factors (Rockart, 1979), where groups of variables act as promoters or inhibitors of a given phenomenon. Bullen and Rockart (1981) defined the term critical success factor as key areas that are crucial for achieving objectives and goals successfully. Pioneering, Luftman et al. (1999) demonstrated the relationships between a set of 14 factors and their role as promoters of IT strategic alignment. Examples of this set were elements such as the support of top management to the IT area and the involvement of the IT area in the strategic formulation. On the other hand, they also presented a set of 13 factors that acted as inhibitors of IT strategic alignment. Of these, the lack of close relationships between the IT area and the business area and the lack of adequate prioritization of projects stood out.

Although such factors showed a common path to reach IT strategic alignment, other contributions emphasized the reasons that determine the difficulties in implementing it in organizations (Angell & Ilharco, 2004; Santos, 2005). These works argued that there is a tautological character in the definition of the term itself (Maes et al., 2000), with a wide variety of definitions that make it impossible to achieve unity regarding its concept (Brodbeck & Saccol, 2004). Reinforcing the criticisms, Ciborra (1997) argues that the proposed models do not show a measure of IT strategic alignment, making it difficult to measure its effectiveness in the organization. On the other hand, Maes et al. (2000) point out that there are difficulties in understanding the strategic alignment of IT with the business as a stagnant result or a continuous process.

Despite the gaps discussed, other studies discuss the strategic alignment of IT as the result of the efforts made by the organization within the scope of its IT projects, materializing it in its deliveries (Chiang & Nunez, 2013). According to Kearns and Sabherwal (2006) and Weiss and Thorogood (2011), the strategic alignment of IT with the business is influenced by the IT department's services and capabilities within IT projects. It is driven by the organization's technological needs, which are in turn motivated by the objectives outlined in its planning process and the competitive environment.

2.2. Projects Management

By definition, the term project consists of the effort carried out in a certain period of time and spent by a group of individuals, where its result comprises distinguishable elements given its exclusivity in relation to the products of other activities performed (Project Management Institute, 2008a). According to Marques Junior and Plonski (2011), projects seek to promote changes in organizations, while helping to implement business strategies. The adoption of organizational management models based on projects is a reality that permeates several markets around the world (Gray & Larson, 2009). Factors such as the intensified competition in these markets, the increase in the complexity of projects, corporate downsizing and, with it, the promotion of empowerment, have been pressing organizations to apply project management methods and techniques aiming at greater results (Fortune & White, 2006; Rehder & Rotondaro, 2010).

Adams and Barndt (1988) and King and Cleland (1988) were pioneers in highlighting that projects have a life cycle subdivided into four phases: conception, planning, execution and closure. The conception phase is related to the recognition by top management of a strategic need. In turn, the planning phase consists of a set of decisions made by top management that determine whether or not to proceed with the initiative. The execution phase, on the other hand, is characterized by the construction of results based on the use of earmarked resources. Finally, the closing phase comprises the demobilization of resources associated with the project (Pinto & Slevin, 1988).

The occurrence of several initiatives that result in projects is a common fact in organizations, which denotes diversified efforts that occur simultaneously, even promoting the sharing of resources between projects, putting pressure on the execution capacity (Kerzner, 2006). This set of simultaneous initiatives makes up the organization's project portfolio, which is still composed of planned projects whose execution is expected in a future scenario (Davila et al., 2007). Project portfolio management requires the use of specific techniques and procedures that aim to support the decision-making process carried out by top management, in the sense of prioritizing the projects to be executed (Project Management Institute, 2008b), requiring a deep understanding of the elaborated strategies of the present objectives in strategic planning (Jaeger Neto et al., 2013). When an organization prioritizes its projects, it does so according to the relevance of each project to organizational strategies, assigning them an order that gives priority to execution (Castro & Carvalho, 2010). The prioritization process compares projects based on elective criteria pre-established by the organization's top management (Archer & Ghasemzadeh, 1999), with financial criteria being the most common comparing projects with each other (Cooper et al., 1998).

According to Chiang and Nunez (2013), project prioritizations carried out in a wrong or ad hoc manner result in lost investment, underutilization of resources and available execution capacity, failure to meet the intended objectives, not promoting changes in the organization and loss of confidence in the agreed commitments aimed at benefits for the organization. Such concerns end up falling on the execution of the projects, evidencing the search for the success of the projects to the detriment of their failure. There is no consensus in the literature on the definition of project success, which is often an ambiguously established concept (Nguyen et al., 2004). According to Cooke-Davies (2002), success and failure of a project are mutually exclusive binary conditions that are based on the achievement or not of the project objective. However, such perspectives of success have been expanded, as several contributions introduce new elements, such as the look at success in project management (Berssaneti et al., 2014). Marques Júnior and Plonski (2011) argue that efficiency in the relationship established between the project scope, its cost and deadline is also seen as a measure of success in managing these project components. This relationship is commonly referred to as the iron triangle.

From this aspect derives the debate about project management, where contributions from two different approaches are discussed. The first one, called the traditional approach, adopts planning techniques, intensive use of control tools, good practices and a strong rationalist and normative character to ensure the efficient use of resources and coordination of project activities (Shenhar, 2001; Carvalho & Rabechini Junior, 2007). The central argument of the traditional approach is that any project can be managed under widely accepted conditions (Cleland & Ireland, 2006). Shenhar (2001) and Shenhar and Dvir (2007) criticize the traditional approach, since it completely ignores the dynamics of the project implementation process and its susceptibility to the influence of external elements. Thus, these authors launch arguments in favor of an adaptive approach, proposing a contingency perspective, taking into account the uncertainty and complexity of different types of projects.

IT projects, in particular, have specific characteristics. In general, its objectives are associated with the development and implementation of organizational process automation solutions, as well as the insertion of a new business process for the organization based on a new type of technological solution (Weiss & Thorogood, 2011). As pointed out by Varajão et al. (2022), the success of information systems projects is extremely important not only for IS, but also for the overall success of organizations, as the two are closely linked. Additionally, research has identified critical success factors for IS projects, including effective organizational communication, project team capability/competence and executive commitment, among

others (Yohannes & Mauritsius, 2022; Abule & Aduomer, 2022). However, the progress of these projects can be compromised due to breaks and delays in the schedule, difficulties in defining the scope and inadequate allocation of organizational resources (Cooke-Davies, 2002). Such occurrences can make other initiatives of the organization unfeasible and even the defined strategies (Gray & Larson, 2009). Projects that aim to develop information systems use a wide range of development methodologies that aim to reduce such impacts (Sommerville, 2011; Pressman, 2011). The purpose of an IT project is, in a global interpretation, to promote value to the business area through the skills of the IT area (Kearns & Sabherwal, 2006). These skills derive from the responsibilities assumed by the IT area which, according to Cassidy (2006), are hierarchically established according to the proposed business value, ranging from back-office activities to those that deal with the organization's strategies.

3. Methodology

In regard to the research strategy used, the field survey was chosen. According to Babbie (1999) and Creswell (2010), the survey presents a quantitative description of measurement units as measured by the researcher from the answers obtained from a sample of the researched population, through closed questionnaires or structured interviews.

The motivation to carry out the research in the chosen company was due to the adoption, from the year 2010, of methods and techniques of project portfolio management, aiming to consolidate the governance of IT through an IT strategic committee. The focus of this committee's activities is on business and IT plans, as well as the prioritization of IT projects. These efforts were recognized by the 2012 iGovTI survey, where the company achieved first place overall in the rank of good IT governance practices (Tribunal de Contas da União, 2013).

The delimitation of the population of this research advocated the fundamentals highlighted by Hair Junior et al. (2005), composing it with actors directly related to the researched phenomenon. Thus, the research population was clearly defined, being composed of 378 functional managers and advisors from the business areas and by 96 functional managers, advisors and employees, in non-management functions, belonging to the IT area, totaling 474 individuals. This set of actors is the one that is closest to the context of IT project management at the company, as they assume the key roles in the prioritization process for the execution of these projects (sponsor, requestor, project manager, and project team member).

Bearing in mind the characterization established above for the research population, for the purposes of establishing its sample, the probabilistic, stratified and proportional sampling typology was adopted, dividing it into two distinct groups: business stratum and IT stratum. As taught by Fávero et al. (2009) and Flick (2012), such groups were defined as the research analysis units, including, individually, the respective respondents from each stratum.

Thus, using the formula for the sample calculation of a finite population (Fávero et al., 2009), a sample space of 80 individuals was obtained in total (64 business strata and 16 IT strata), defined for a sampling error of 5%, with a confidence level of 95% (Hair Junior et al., 2005) and observing the proportions of strata in the population (79.75% business stratum and 20.25% IT stratum).

Considering the characteristics and assumptions of data analysis techniques, it is important to note that bivariate techniques typically require a sample size of at least 30 individuals or cases, while multivariate techniques necessitate a minimum of 100 individuals or cases (Corrar et al., 2012). Therefore, we defined the sample size as 148 individuals, comprising 118 from the business strata and 30 from the IT strata, ensuring that the proportions of each stratum reflect those in the overall population.

The study participants were identified through the company's employee records. They were then invited to take part in the research by receiving direct email communications. These emails contained a link that allowed the participants to access and complete the electronic version of the survey questionnaire. The sample is predominantly composed of individuals

with employment at the company for a period between 6 and 15 years. There is also a portion of individuals with a tenure between 16 and 25 years. Furthermore, the sample shows that these individuals were involved in at least one IT project during the 2013 to 2015 period. Additionally, the sample contains a share of individuals who identified themselves as requestors of the IT projects in which they were involved. Predominantly, the sample consists of individuals who participated in IT projects as clients, with a portion of projects focused on the modeling and automation of organizational processes.

The instrument used in data collection contained twelve closed questions, referring to the influence of factors promoting alignment on the success of IT projects, constituting the metric variables of the research.

In order to preserve the assumption of randomness of the probabilistic sample, the instrument was sent to the entire population through specific messages for the business and IT strata, allowing the identification of the respondent's origin group. Each message had a link that directed the respondent to a digital version of the instrument, counting the number of accesses and attempts to complete it, discarding those not carried out in its entirety and ending access to the questionnaire as the number of respondents reached the requirement sample.

For the elaboration of the instrument, a methodological procedure was adopted following Gil (2008) and Flick (2012), presenting questions and scales that obeyed the principle of exhaustiveness, maintaining the link between the questions and the research objective. Due to material and research performance reasons, an arbitrary criterion was adopted, intending to limit the number of variables evaluated. For Cooper and Schindler (2003), this contributes to avoid research instruments excessively long.

This criterion consisted of inserting, as research metric variables, only the factors promoting the strategic alignment of IT that were included in at least two different works identified in the investigated literature. Thus, the development of a consistent instrument was expected, since the factors used were the most widespread in the literature. The selected promoting factors, as well as their respective coding in the instrument, are shown in Table 1.

Table 1. Survey metric variables

Promoting Factors	
Top management support to the IT area (QSP02A)	IT's staff understanding of the business (QSP02H)
Proper communication between IT and the business (QSP02B)	IT's staff involvement in strategic formulation (QSP02I)
Connection between IT and business plans (QSP02C)	Appropriately estimated budget and resources for IT (QSP02J)
Confidence in achieving the commitments made by IT and the business (QSP02D)	Partnerships, alliances and close relationships between IT and the business (QSP02L)
Proper prioritization of projects (QSP02E)	Qualification of IT staff (QSP02K)
Understanding of IT by the business (QSP02F)	IT is applied to achieve competitive advantage (QSP02M)

Source: Compiled from Luftman et al. (1999), Teo and Ang (1999), Reich and Benbasat (2000), Burn and Szeto (2000) and Galas and Ponte (2006).

To measure the variables, a five-point interval scale was used, where each point received the labels of totally inhibit (1), partially inhibit (2), neither promote nor inhibit (3), promote partially (4) and promotes fully (5). For this scale, as argued

by Cooper and Schindler (2003) and Fávero et al. (2009), the relative zero is established by the median of the scale, which is the value 3.

Regarding the analysis of the collected data, a technique of interdependence analysis called multidimensional scaling (MDS) was used, since the metric variables investigated do not have a dependence relationship with other variables, and their measurements are restricted to the participants' perceptions of the variables associations of the factors evaluated and the success of IT projects.

Such characteristics meet the requirements for using the MDS pointed out by Manly (2008) and Hair Junior et al. (2009). In addition, the choice for the MDS also resided in its presentation characteristic, since it uses a multidimensional plane, called perceptual map, demonstrating the associations established between the investigated variables, based on the impressions obtained on them (Cooper & Schindler, 2003). A perceptual map is a graphical representation that divides a diagram space into distinct regions based on varying characteristics and then plots objects within the diagram based on their values compared to those regions. This type of map is commonly employed to illustrate the connections between various subjects that can be evaluated across a range of attributes. By utilizing a perceptual map, one can visualize the relative positions of these subjects in relation to each other, as well as their positions in relation to the evaluative attributes (Zheng & Vaishnavi, 2011).

As instructed by Fávero et al. (2009), the DMS perceptual map was obtained from the calculation of Euclidean distances and the correlations established between the variables investigated, resulting in a matrix of distances or dissimilarities of measurements obtained for each variable.

The tests of stress or tension S from Kruskal and Young's S-stress were adopted in order to obtain the degree of adjustment to which the matrix was submitted to form the perceptual map, with values between 0 and 0.20 being preferable, as well as said by Hair Junior et al. (2009). Finally, it was necessary for the MDS, to measure the reliability, safety and quality index (RSQ), to assess the quality of the adjustment suffered by the distance matrix, with values close to 1 being preferable.

According to Cohen (2003), the interpretation of perceptual maps resulting from the DMS has been enriched with the use of facet theory, a quantitative data analysis resource that aims to identify existing patterns among the analyzed variables, expressing them in facets. The use of facet theory has been common in research related to social science fields (Bilsky, 2003), but less so in IS research (Soper & Turel, 2016).

The most common facet patterns are polar, modular, and axial. The polar pattern presents an opposition between facets formed by distinct sets of variables, with the underlying facets having some degree of association. On the other hand, the modular pattern is characterized by presenting layered facets, with the innermost layers being those that have a greater association with the object of analysis. Finally, the axial pattern scales parallel facets, where underlying facets have some level of association with each other and non-boundary facets have no level of association (Guttman & Greenbaum, 1998).

As pointed out by Guttman and Greenbaum (1998), it is perfectly possible that, in the same analysis, more than one type of the mentioned patterns are identified. Thus, new patterns are constituted, such as radex, duplex and cylindrex, inheriting the characteristics of the patterns involved. Figure 1 presents some of the mentioned patterns.

The identification of facets in the perceptual maps was supported by theoretical elements from the literature on the strategic alignment of IT with business, as well as contributions related to project management. According to Bilsky (2003) and Greenbaum (2009), this approach enables researchers to design the facets by identifying the associations between variables and the relationships among the facets.

In carrying out this research, a rigid posture was adopted in the control of the occurrence of missing values which, according to Hair Junior et al. (2009), enable the production of data sets with biases in their formations. Coding was also used for the questions contained in the instrument, facilitating the preparation of the data file and avoiding the occurrence of measurement and analysis errors with the statistical software, as recommended by Gil (2008).

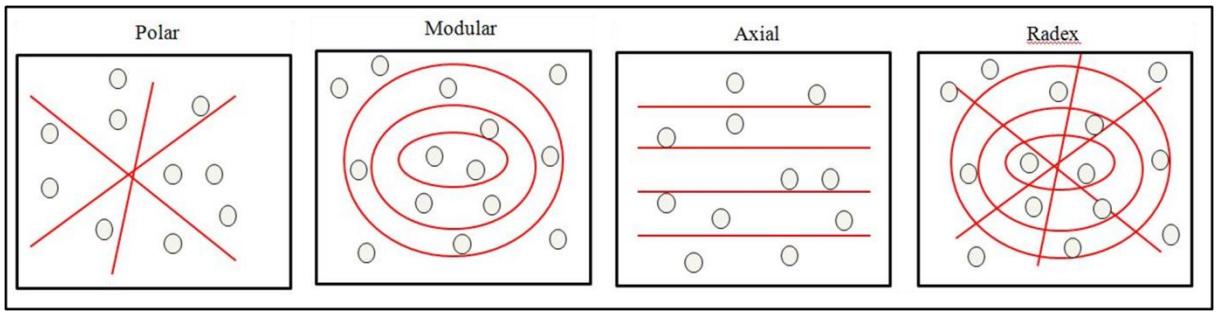

Fig. 1. Facet patterns in multidimensional scaling
Source: Adapted from Guttman and Greenbaum (1998) and Bilsky (2003).

4. Results

For descriptive purposes and with the intention of identifying the existing associations between the factors promoting the strategic alignment of IT and the success of IT projects, the perceptions of the strata of the sample regarding these factors were measured. Table 2 shows the absolute frequency (ni) of the answers obtained regarding the success of IT projects (n = 148), distributed according to the scale points reported by the respondents.

Table 2. Absolute frequency of variables that influence the success of IT projects

Variable	1	2	3	4	5
Top management support to the IT area	3	4	2	30	109
Proper communication between IT and the business	3	3	2	70	70
Connection between IT and business plans	2	4	9	64	69
Confidence in achieving the commitments made by IT and the business	3	1	14	57	73
Proper prioritization of projects	2	3	11	59	73
Understanding of IT by the business	1	3	45	65	34
IT's staff understanding of the business	1	2	5	52	88
IT's staff involvement in strategic formulation	2	3	21	77	45
Appropriately estimated budget and resources for IT	2	4	15	84	43
Partnerships, alliances and close relationships between IT and the business	1	3	14	67	63
Qualification of IT staff	2	3	8	54	81
IT is applied to achieve competitive advantage	3	4	27	62	52

The constitution of the distance matrices in this research considered the peculiar characteristic of the MDS, which uses only a general measure of preference or similarity between objects (Hair Junior et al., 2009). Thus, the coordinates of the variables in the perceptual map do not reflect a measure of causality, but of dissimilarity between the variables analyzed (Manly, 2008).

Table 3 presents the coordinates obtained for the factors promoting IT strategic alignment. Stress tests showed an adequate adjustment of the variables and their associations for two arbitrary dimensions (S = 0.125; S-stress = 0.096), with a high-quality index (RSQ = 0.938).

Table 3. Matrix of distance from factors promoting strategic alignment to the perceptual map of success in IT projects

Variable	Code	Dimension 1	Dimension 2
Top management support to the IT area	QSP02A	1.9966	-.0191
Proper communication between IT and the business	QSP02B	.6227	.3405
Connection between IT and business plans	QSP02C	.3231	-.5919
Confidence in achieving the commitments made by IT and the business	QSP02D	.5434	.5716
Proper prioritization of projects	QSP02E	.1780	.4503
Understanding of IT by the business	QSP02F	-2.9275	-.5821
IT staff understanding of the business	QSP02H	1.1478	-.4437
IT staff involvement in strategic formulation	QSP02I	-.9599	-.9983
Appropriately estimated budget and resources for IT	QSP02J	-.6886	.0991
Partnerships, alliances and close relationships between IT and the business	QSP02K	.1720	-.8057
Qualification of IT staff	QSP02L	.6368	.2025
IT is applied to achieve competitive advantage	QSP02M	-1.0445	1.7768

The resulting perceptual map is presented in Figure 2. The elements extracted from the literature review were used to interpret the perceptual map meaning. The facet patterns found and what researchers think about them are discussed in the next section.

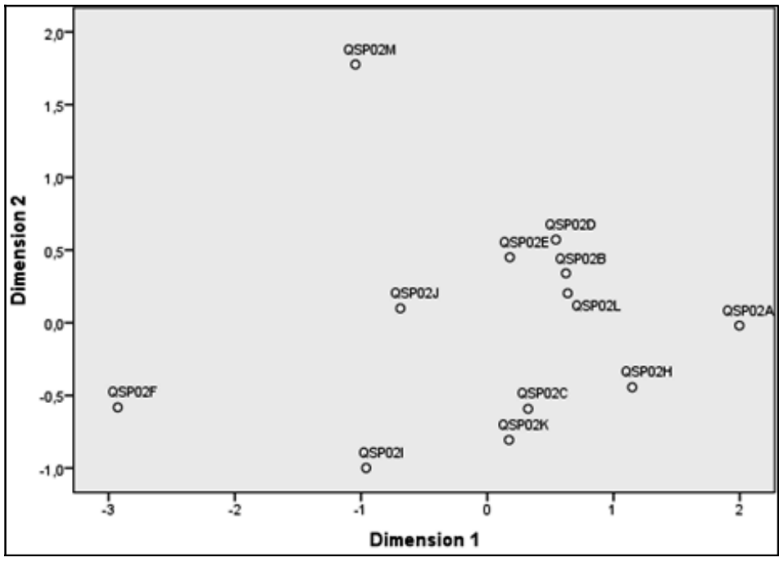

Fig. 2. Perceptual map of factors promoting alignment for the success of IT projects

5. Discussion

As can be seen in the Figure 2, there is a clear distance between certain pairs of variables, such as support from top management and the understanding of IT by the business, as well as involvement in strategic formulation and the achievement of competitive advantage. In general, these findings lead to the interpretation that, for the investigated population, there are different levels of association between the factors promoting the strategic alignment of IT and the success of IT projects. In the map, the variables that are closer together express a lower level of dissimilarity, while those

that are farther apart exhibit higher levels of dissimilarity. However, this information does not fully clarify the interpretation of the perceptual map, necessitating the use of other elements to understand the identified associations.

By applying facet theory, as described by Canter (1996), it was possible to identify several dissimilarities among the metric variables, relying on the assumptions that these variables are mutually exclusive and possess conceptual relationships. Two main patterns were identified on the perceptual map. The axial pattern (blue lines) presents four facets and the modular pattern (red ellipses) is designed with two of them. The identification of facets involved interpreting the groups of variables to understand their meaning and relationships to the overall phenomenon being studied. The perceptual map with the facet patterns found is shown in Figure 3, and it is possible to notice the concomitant presence of the axial (blue) and modular (red) facet patterns, thus constituting a third facet pattern, the radex pattern.

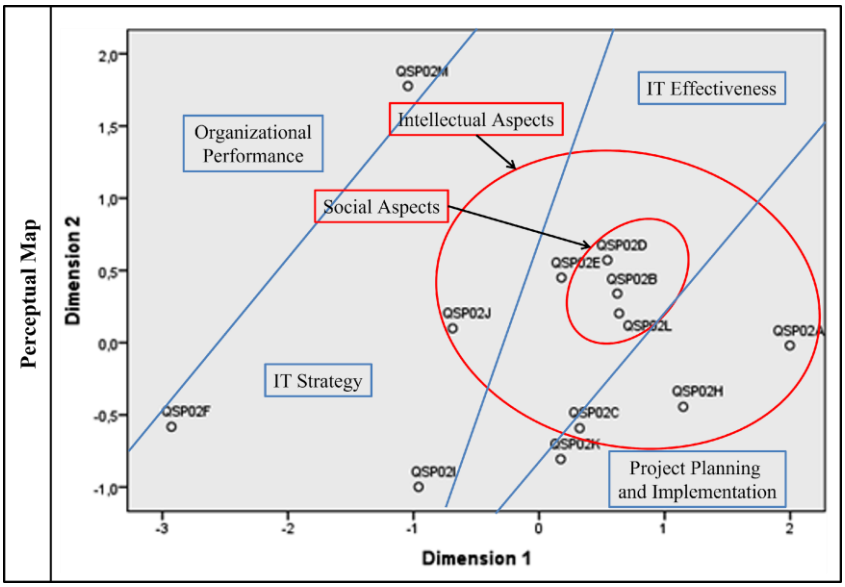

Fig. 3. Radex pattern of factors promoting alignment for the success of IT projects. Blue lines represent the axial pattern and red lines represent the modular pattern

First, we discuss how the axial pattern was interpreted. Based on the contributions of Kearns and Sabherwal (2006), the "project planning and implementation" axial facet was constituted by grouping the variables "support from top management to the IT team" (QSP02A), "connection between IT and business" (QSP02C), "IT understanding about business" (QSP02H), and "partnerships, alliances, and close relationships between the business and information technology teams" (QSP02K).

Following those authors' view, the IT projects planning gets positive effects when the business strategic plan and the IT strategic plan are built together both by business and IT managers. Once the IT strategic alignment is established, the organization perceives less problems on IT projects implementation. These factors presented dissimilarities that allowed inferring their associations to project planning and successful implementation, as can be seen in their grouping at the right side of the Figure 3. That agrees with Hacker and Doolen's (2007) statement that the success of IT projects is sustained by the sponsorship of top management and the mutual understanding of the relationship between IT and business.

The “IT effectiveness” axial facet derives from Chan et al. (1997) understanding that the IT effectiveness is directly related to the implemented IT strategy. This facet encompasses the following variables: "adequate communication between business and IT" (QSP02B), "confidence in reaching commitments made by business and IT teams" (QSP02D), "proper project prioritization" (QSP02E), and "IT staff qualification" (QSP02L). This perspective is similar to Cassidy's (Cassidy, 2006) view that inadequate prioritization and deficient resources hinder the IT strategic planning execution and reduce IT effectiveness. This interpretation is grounded on these author’s conceptions, but it is clear the proximity of the variables grouped in the center right of the Figure 3.

The next axial facet was called the "IT strategy". Its starting point is Henderson and Venkatraman's (1993) thought, IT strategy is a consequence of the business perception about the IT role in the organization. The variables "understanding of IT by the business" (QSP02F), "IT team involvement in strategic formulation" (QSP02I), and "properly estimated budget and resources for IT" (QSP02J) showed dissimilarities that associated them with the development of IT strategy and how IT supports business strategies.

The last axial facet of the perceptual map displays only one variable, "IT is applied to achieve competitive advantage" (QSP02M). This facet was declared "organizational performance" and its high dissimilarity degree shows differences between the application of IT to achieve a competitive advantage and other variables. Also, it means differences in their association with IT projects success. The axial facets (organizational performance, IT strategy, IT effectiveness, and project planning and implementation) exhibit an increasing intensity and relevance from left to right in the Figure 3.

In regards to the second pattern interpretation, the modular pattern, we used Reich and Benbasat (1996) contributions to define the "social aspects" modular facet. For those authors, the IT strategic alignment with business is established through social factors like "adequate communication between business and IT" (QSP02B), "confidence in reaching commitments made by business and IT teams" (QSP02D), and "IT staff qualification" (QSP02L).

Such aspects are related to the understanding of business and IT plans by managers from both teams, the establishment of win-win ties between them, and the communication adjustment for better planning integration. The social aspects facet brings together elements with dissimilarities that endorse the understandings of Teo and Ang (1999) and Cassidy (2006) about their repercussions on IT and business plans and IT value delivery to the business.

On the other hand, the modular facet “intellectual aspects” represents the associations between “support from top management to the IT team” (QSP02A), “connection between IT and business” (QSP02C), "proper project prioritization" (QSP02E), “IT understanding about business” (QSP02H), and "properly estimated budget and resources for IT" (QSP02J). For Reich and Benbasat (1996), such aspects are linked to the validation and consistency of IT and business plans, covering methodologies and tools used in planning and strategy formulation, and also how IT initiatives are managed.

Furthermore, the modular pattern can also be interpreted in light of the debate between traditional and adaptive approaches to project management. This interpretation relies on the association between the variables that refer to intellectual aspects and the rationalist and normative character expressed in the traditional approach, as described by Carvalho and Rabechini Junior (2007). The variables that refer to social aspects are close to the contingency issues of the adaptive approach, as pointed out by Shenhar and Dvir (2007).

Under the conditions presented in this research, a radex-type standard is constituted and, given its nature (Guttman & Greenbaum, 1998), establishes the understanding that top management support for the information technology area (QSP02A), the connection between IT and the business (QSP02C) and the understanding of the business by IT (QSP02H), are intellectual aspects of strategic alignment that focus on the planning and implementation of projects, while the correct prioritization of projects (QSP02E) and the occurrence Estimated budget and resources for IT (QSP02J), are intellectual aspects of strategic alignment associated with IT effectiveness and IT strategy. Figure 3 further illustrates that the variables present in the modular facets (intellectual aspects and social aspects) have more intense and relevant associations, moving from the inside out, regarding the success of IT projects. Meanwhile, the axial facets (organizational performance,

IT strategy, IT effectiveness, and project planning and implementation) show an increasing intensity and relevance from left to right in terms of associations.

Therefore, the intellectual elements are instruments that allow connecting the social aspects of the strategic alignment, such as adequate communication between IT and the business (QSP02B), establishing trust in the achievement of the commitments made between the two areas (QSP02D) and qualification of the IT staff (QSP02L), with what is planned for an IT project and the strategic vision that the IT area has of its activities.

In other words, the success of IT projects and their consequences for organizational success is based on elements associated with the social aspects and the effectiveness of the IT area in establishing the connection between the elements of the IT strategy and the elements of planning and implementation of projects, through the intellectual aspects.

6. Conclusion

This study contributes to the academic field by examining the factors that promote strategic alignment between IT and business and their association with project success. The findings highlight the diverse levels of association between these alignment factors and project outcomes, providing valuable insights into their influence. The study's interpretation of these associations underscores their fundamental role in the success of IT projects, particularly in terms of social aspects such as effective communication between IT and business departments, confidence in meeting commitments, and the competence of the IT staff. These findings deepen our understanding of IT project management and strategic alignment, adding empirical evidence to the existing body of knowledge.

In addition to its academic contributions, this study offers practical implications for organizations seeking to enhance the success of their IT projects. The identification of factors that promote strategic alignment and their connection to project outcomes provides actionable insights for decision-makers. The study emphasizes the importance of fostering robust communication channels between IT and business teams, instilling confidence in fulfilling commitments, and prioritizing the development of a skilled IT workforce. Implementing these findings can help organizations improve their IT project performance and increase the likelihood of achieving desired outcomes. Furthermore, the study's focus on the social aspects of alignment highlights the significance of interpersonal relationships and collaborative efforts in project success. This practical knowledge can guide organizations in designing effective strategies and practices that align IT initiatives with business objectives, leading to more successful project outcomes.

It is important to acknowledge certain limitations of this study. Firstly, the research was conducted within a specific context, focusing on a particular public company in the Brazilian electricity sector. Therefore, the findings may not be fully generalizable to other industries or organizational settings. Secondly, the study relied on self-reported perceptions of business and IT managers, which may be subject to bias or individual interpretations. Future studies could consider incorporating multiple data sources or utilizing objective performance metrics to enhance the robustness of the findings. Lastly, the research did not explore potential external factors or environmental dynamics that could influence the strategic alignment of IT and project success. Considering these factors in future studies could provide a more comprehensive understanding of the subject.

Building on the insights gained from this study, future research avenues can be pursued. Firstly, conducting similar investigations in different industries or organizational contexts would help validate and expand the generalizability of the findings. Additionally, exploring the role of external factors, such as market competition or regulatory changes, in shaping the strategic alignment of IT and project success would provide a more holistic understanding. Furthermore, investigating the temporal dynamics of alignment factors and project success over the project lifecycle could offer valuable insights into the evolving nature of IT project management. Finally, integrating qualitative research methods, such as interviews or case studies, could provide in-depth perspectives and rich narratives that complement the quantitative findings. These future

research directions would contribute to a deeper understanding of IT strategic alignment and project success, further advancing the field.

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Appendix A. Research instrument

QCR01 - How long have you been employed at the company?

(1) Less than 5 years

(2) 6 to 15 years

(3) 16 to 25 years

(4) 26 to 35 years

(5) More than 35 years

QCR02 - During the period from 2013 to 2015, how many IT projects were you involved in?

(0) None

(1) Only 1 project

(2) 2 to 3 projects

(3) 4 to 5 projects

(4) 6 or more projects

QCR03 - Indicate the role(s) you played in the most recent IT project you were involved in:

(0) I was not involved in any IT projects during that period

(1) Project requestor (presented a need that resulted in an IT project)

(2) Project sponsor (created the conditions for the IT project to exist and be prioritized and executed)

(3) Project manager (responsible for the execution activities of the IT project)

(4) IT team member on the project (supported the execution activities of the IT project)

(5) Business team member on the project (supported the execution activities of the IT project)

QCR04 - What was the nature of the most recent IT project you were involved in?

(0) I was not involved in any IT projects during that period

(1) Client project (IT projects generated from business area demands)

(2) Structuring project (IT projects generated from IT area demands)

QCR05 - What was the objective of the most recent IT project you were involved in?

(0) I was not involved in any IT projects during that period

(1) Only automating a previously modeled process

(2) Only modeling a process without the need for automation

(3) Contracting IT services

(4) Modeling and automating a process in sequence

(5) Providing specific IT infrastructure

QSP01 - Briefly describe what you consider to be the success of an IT project:

QSP02 - According to your view, evaluate the elements below and their relationship to the success of IT projects:

(1) Totally inhibits – (2) Partially inhibits – (3) Neither promotes nor inhibits – (4) Partially promotes – (5) Totally promotes

QSP02A - Top management support

QSP02B - Adequate communication between the IT area and the other areas of the company

QSP02C - Proper connection between the strategic planning of the IT area and the strategic planning of the company

QSP02D - Full confidence in achieving the commitments made between the IT area and the other areas of the company

QSP02E - Correct prioritization of projects

QSP02F - The understanding, by the other areas of the company, of the activities of the IT area

QSP02G - This is a verification question. If you are reading it, mark the "totally inhibits" option.

QSP02H - The understanding, by the IT area, of the activities of the other areas of the company

QSP02I - The involvement of the IT area in strategic planning

QSP02J - Proper estimation of budget and resources for the IT area

QSP02K - The existence of partnerships, alliances and close relationships between the IT area and the other areas of the company

QSP02L - Good qualification of the IT staff

QSP02M - The application of IT to achieve a competitive advantage

QFP01 - Briefly describe what you consider to be the failure of an IT project:

QFP02 - According to your view, evaluate the elements below and their relationship to the failure of IT projects:

(1) Totally inhibits – (2) Partially inhibits – (3) Neither promotes nor inhibits – (4) Partially promotes – (5) Totally promotes

QFP02A - Lack of top management support

QFP02B - Incipient communication between the IT area and the other areas of the company

QFP02C - Fragility in the connection between the IT strategic planning and the company's strategic planning

QFP02D - Lack of confidence in achieving the commitments made between the IT area and the other areas of the company

QFP02E - Inadequate prioritization of projects

QFP02F - Incomprehension, by the other areas of the company, of the activities of the IT area

QFP02G - This is a verification question. If you are reading it, mark the "neither promotes nor inhibits" option.

QFP02H - Incomprehension, by the IT area, of the activities of the other areas of the company

QFP021 - Non-involvement of the IT area in strategic planning

QFP02J - Improper estimation of budget and resources for the IT area

QFP02K - The absence of partnerships, alliances and close relationships between the IT area and the other areas of the company

QFP02L - Poor qualification of the IT staff

QFP02M - The non-application of IT to achieve a competitive advantage

Biographical notes

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