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Information technology outsourcing relationship integration: a critical success factors study based on ranking problems (P.γ) and correlation analysis

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Abstract

Information technology (IT) outsourcing is an interesting alternative for companies that want to obtain certain benefits by delegating IT activities to a provider to keep their focus on their core activities. This outsourcing involves a process that begins with the provider selection, passing through a series of negotiations, and reaching the definition of a contract, which will guide and delimitate the execution of activities, the interaction, and the relationship between the involved parties. To ensure the success of this relationship, several factors under contractual and relational governances have been defined in the literature. This work aims to corroborate the importance of literature findings about contractual aspects and critical success factors by presenting a ranking and correlation analysis and emphasize that companies may use these factors as criteria to improve their outsourcing relationships by developing a partnership status. To meet this objective, we established the main aspects and factors based on the literature, resulting in specific sets. Then, a survey was conducted with outsourcers and providers in the Recife's IT pole (Pernambuco, Brazil) to collect data and determine the relative importance and correlations between the elements of these sets using a methodology based on ranking problems (P.γ) and nonparametrical correlation analysis.

KEYWORDS

contractual aspects, correlation analysis, critical success factors, information technology outsourcing, ranking problems (P.γ)

1 | INTRODUCTION

Organizations sometimes transfer the execution of certain activities to other companies to obtain benefits that range from cost savings to the ability to focus on internal efforts in core activities. The formal designation of this transfer is outsourcing. Information technology (IT) is one of the most outsourced organizational functions, and there are several determinants used by companies to make this decision.

Thus, IT outsourcing (ITO) can be included in the IT investments field, and the main question is how the investment decision guarantees satisfactory effects by increasing productivity and profitability based on IT (Silva & Costa, 2014). Given the strategic relevance of outsourcing in the IT investments area, its determinants can be divided into three classes (Lacity, Khan, & Willcocks, 2009): (a) financial attributes (firm profitability, return on assets, earnings per share, operating expenses, and financial slack in the organization); (b) size attributes

(size of the client firm in terms of total revenues or number of employees or size of the IT department within the client firm); and (c) industry attributes (the type of industry practicing outsourcing).

In an outsourcing process, two main actors can be identified according the principal–agent model (Silvius, Turkiewicz, Keratsinov, & Spoor, 2013): the principal is the organization that engages another, the agent, to perform the outsourced activities. Here, we will designate the principal as the outsourcer and the agent as the provider, following the logic of the outsourcing relationship. Thus, in this work, we consider ITO as the process in which one outsourcer contracts one IT services provider to develop activities related to the services of the IT organizational function.

Polo, Piattini, and Ruiz (2002) and Vasil'ev, Kalyanov, and Levochkina (2010) define a set of benefits of outsourcing including the following: employees focus their attention on the core business, releasing resources for strategic developments, decreasing costs and

increasing productivity, improving of the quality of the services, and gaining access to new cutting-edge technologies and technical knowledge. In contrast, Polo et al. (2002) also mention a set of drawbacks: loss of control or loss of a learning source, loss of knowledge about the focus of outsourced activities, the creation of dependence of the provider, variations in the quality of the product given to the customer, and problems among personnel.

The integration between the outsourcing actors is a core aspect in the coordination of all activities necessary to organize the outsourced services for success. In this process, integration occurs in both the relationship between outsourcer and provider and that between the units and functions within the service provider (Luo, Zheng, & Jayaraman, 2010). Interaction is an initial mechanism to ensure success (or at least prevent failures) in the ITO process, and the management of relationships may rely on the mechanisms underlying these interactions to facilitate the integration (Ruzzier, Sohal, Katna, & Zyngier, 2008).

Companies are becoming aware of the fact that they are part of a network of relationships with partners and customers in which sharing of knowledge and experiences is a prominent issue (Gregoris, Dimitris, Kostas, & Panos, 2006). Sharing knowledge enables the companies involved in an outsourcing process to develop an integrated innovative status based on collaborative innovation, responding to the knowledge economy pressures not alone but through a network of collaborative work (Wang, 2012). However, cultural differences between the companies involved in the outsourcing process can hamper the development of this sharing and the integration itself.

The aim of this paper is to corroborate the suggestion that literature findings in contractual and relational governance can be used as criteria by outsourcers and providers of Recife's IT pole to improve their relationships and establish a partnership after some iterations through an integration process. These literature findings were considered as constructs for the research and were divided into two sets: contractual aspects (CA) and critical success factors (CSF). We intend to use a ranking and correlations analysis to corroborate our ideas about the relative importance of and positive relations between the constructs throughout the integration process, providing evidence to companies about the steps to be followed and the elements to be evaluated to ensure the success of outsourcing as an organizational strategy. The use of a multicriteria approach combined with a statistical analysis was designed to ensure a more objective analysis and, thus, clearer understanding for companies, practitioners, and researchers interested in understanding the dynamics of the outsourcing relationship.

With the defined the construct sets, a survey was conducted to collect data from the companies located in Recife's IT pole, allowing us to apply a methodology based on two formal methods to the data sets. Initially, we used an outranking method to create a ranking of the constructs explored based on the data collected to aid in deciding which was more important in the integration process. This application was supported by the assumption that a decision-making process for ITO problems requires a number of criteria: monetary to intangible and nonmonetary goals at different organizational levels and staff developing activities for the managers of both the outsourcer and provider (Nazari-Shirkouhi, Ansarinejad, Miri-Nargesi, Dalfard, & Rezaie, 2011).

After applying the prioritization, to analyze correlations within each set of the aspects and factors that compose the integration

process, we applied Spearman's statistical nonparametric test. Using the results of the statistical tests, we then developed a comparative and practical analysis based on the two perspectives.

The rest of this paper is organized as follows. Section 2 presents and discusses the theoretical concepts involved with contracts and relationships to provide a basis for the CA and CSF sets applied in research. Section 3 describes the methodological approach used to perform the research, mainly defining the methods used to rank and select the most important elements of the integration process and study the relationships within each subset of selected elements. Section 4 defines and explains the integration process and presents the results of the outranking method applied to the constructs. Section 5 presents the results of statistical tests relating to the selected constructs. Section 6 is a general discussion of the research findings. Finally, we draw our conclusions, presenting the main limitations of this work and proposing further works.

2 | CONTRACTUAL AND RELATIONAL GOVERNANCE: ASPECTS AND FACTORS

Before defining the sets of aspects and factors, the concepts of contract and relationship management and contractual and relational governances must be presented according to the theoretical findings. We must consider that all the interaction processes in ITO begin with the selection of the provider and setting of the contract, with the latter requiring some form of management.

Thus, contract management can be understood as a method for the construction of the contract as a whole, including all relevant information obtained through research at the technical, managerial, and legal levels to ensure clarity, objectivity, and credibility and enable its revocability (Gibbons & Henderson, 2012; Vanneste & Puranam, 2010; Xu & Sun, 2010). It is not a standardized or uniformed procedure because the contracts include a wide variety of elements and aspects (Kähler, 2013).

In turn, contractual governance functions throughout the duration of the project, providing a safeguard against the existing risks that could cause loss of performance and increased costs during management (Poppo & Zenger, 2002). It can be understood as a tool for managers to control the quality of services delivered while ensuring that additional costs are minimized.

By virtue of the interaction necessary for implementation, as defined in the contract, the relationship between outsourcer and provider must also be managed. Therefore, the broadly construed concept of relationship management involves the business processes and activities needed to establish and maintain relationships between companies and their customers (Kalaignanam & Varadarajan, 2012).

Relational governance addresses the softer aspects in the outsourcing relationships through social interactions between the parts: trust, norms, open communication, open sharing of information, mutual dependency, and cooperation (Lacity et al., 2009). Similar to contractual governance, relational governance is a tool for managers to control relationship issues and promote integration at each cycle of interaction between the actors involved in the outsourcing (Huber, Fischer, Dibbern, & Hirschheim, 2013).

On the basis of the assumptions of each type of governance, we searched for CA and CSF in literature to explore these topics in our

research. In the following, we provide a description of each set of constructs found via our literature search.

2.1 | Contractual aspects

CA include all the constructs related to the composition and execution of outsourcing contracts (Power, Desouza, & Bonifazi, 2006). Table 1 shows the identified and applied CA and also indicates the related works.

2.2 | Critical success factors

CSF include all the approaches, activities, and practices that should be considered to ensure effective management and maintenance between the parties involved in a relationship to ensure the success of a project (Kumaraswamy, Ling, Rahman, & Phng, 2005). We highlight that the CSF set initially adopted for the outsourcers was smaller than that adopted for the providers, which is justified by the

restructuring of the questionnaire applied to the providers' perspective. To distinguish each specific set, we adopted the following acronyms: O.CSF for outsourcers and P.CSF for providers. Table 2 presents the CSF adopted for the outsourcers' perspective.

Table 3 presents the CSF adopted for the providers' perspective.

In Table 3, the conceptual relations between P.CSF7 and P.CSFs 8, 9, 10, and 11 is evident. In addition, there is a conceptual relationship between P.CSF12 and all the CA; however, these relationships will not be tested because the focus of this work is on the tests inside each set of constructs, not between them. Section 3 will present the correlation test results and discuss them.

3 | METHODOLOGICAL APPROACH

Our research methodological approach consisted of four phases. The first phase considered extensive bibliographical research on the key

TABLE 1 CA identified and used by both outsourcers and providers.

Contractual aspect	Description	Related works
CA1—Service level agreement	Related to the description of the services, goals and objectives, and defining the roles and responsibilities between the parties of an outsourcing contract.	Willcocks, Lacity, and Fitzgerald (1995); Power et al. (2006); Lacity et al. (2009).
CA2—Detailed contract	The definition of the detailed and complete contract as a legal document.	Power et al. (2006); Furlotti (2007); Lacity et al. (2009).
CA3—Incorporate procedures to flexibility	The ability of all parties to adapt themselves to possible changes in the course of the outsourcing relationship.	Willcocks et al. (1995); Power et al. (2006); Lacity et al. (2009); Boulaksil, Grunow, and Fransoo (2011); Beimborn, Joachim, and Weitzel (2012).
CA4—Definition of penalties for low performance and information violations	Determining punishments for all parties if they do not comply with contractual determinations for the service delivery.	Lee, Miranda, and Kim (2004); Power et al. (2006); Goo and Huang (2008); Lacity et al. (2009).
CA5—Duration of contract	Determining how long the contract will last and setting deadlines for its beginning and end.	Lee et al. (2004); Power et al. (2006); Goo, Kishore, Nam, Rao, and Song (2007); Lacity et al. (2009).
CA6—Costs	Determining the costs involved for the service development and delivery.	Gottschalk and Solli-Sæther (2006); Power et al. (2006); Dias Ferreira and Barbin Laurindo (2009); Lacity et al. (2009); Beimborn et al. (2012).

Note. CA = contractual aspects.

TABLE 2 CSF identified and used in research relating to outsourcers

Critical success factor	Description	Related works
O.CSF1—Selection of the correct provider	Aims to evaluate the IT provider's skills in order to ensure effectiveness in the activities that will be performed.	Aloini, Dulmin, and Mininno (2010); Chen, Wang, and Wu (2011); Chen and Chao (2012).
O.CSF2—Alignment of outsourcers' and providers' objectives	Refers to analyzing the strategic alignment between outsourcers and providers.	Zhang, Xue, and Dhaliwal (2015).
O.CSF3—Clear vision of outsourcer's objectives	Refers to understanding outsourcers' objectives for the services provided.	Bensghir and Tekneci (2008); Ko and Fink (2010); Prasad, Heales, and Green (2010); McKenzie, van Winkelen, and Grewal (2011); Ferguson, Green, Vaswani, and Wu (2013).
O.CSF4—Clear and well-structured outsourcing contract	The accomplishment of a set of contractual aspects defined previously.	Derived from CA set.
O.CSF5—Outsourcer-provider relationship	Characterized by the adequacy and cooperation between outsourcer and provider.	Kern and Willcocks (2000); Janssen, Luciano, and Gregianin Testa (2013); Jyoti and Arora (2013).

Note. CA = contractual aspects; CSF = critical success factors; O.CSF = critical success factors for outsourcers.

TABLE 3 CSF identified and used in research relating to providers

Critical success factor	Description	Related works
P.CSF1 – Commitment by managers of outsourcer company	Commitment by managers of outsourcer company to warrant that contractual determinations will be accomplished.	Power et al. (2006); Goo & Huang (2008); Lacity et al. (2009); Chou et al. (2015).
P.CSF2 – Well-structured planning for services to be provided	Development of planning with a complete and detailed description of the services that will be provided, with participation of both outsourcer and provider.	Power et al. (2006); Goo & Huang (2008); Gadatsch (2009); Gorla & Somers (2014).
P.CSF3 – Flexibility of staff to develop activities related to services	Capacity of the staff to adapt to any kind of activity related to the services that the provider will develop.	Power et al. (2006); Lacity et al. (2009); Urbach & Würz (2012); Patil & Patil (2014).
P.CSF4 – Adaptability to possible changes of the services	Capacity of the providers' staff to adapt to changes on the activities definition for the development of the services.	Patil & Patil (2014); Chou et al. (2015).
P.CSF5 – Providers' staff training	Level of training/education of the providers' staff related to the services that will be provided.	Power et al. (2006); Luo et al. (2010); Vasil'ev et al. (2010);
P.CSF6 – Documentation of all activities performed and services provided (Organizational Memory)	Register of all elements and procedures performed to obtain the service, composing a set of operational reports and increasing Organizational Memory.	Polo et al. (2002); Power et al. (2006); Aydin & Bakker (2008).
P.CSF7 – Customer Relationship Management (CRM)	Use of CRM strategies by provider companies to create a portfolio of clients, keeping them closer and ensuring their loyalty.	Oza et al. (2006); Power et al. (2006); Goo & Huang (2008); Liu et al. (2013) and related to O.CSF5 in Table 2.
P.CSF8 – Use of the information system for Customer Relationship Management	Use of CRM Information Systems, supporting P.CSF7 strategies.	Derived from P.CSF7
P.CSF9 – Evaluation of Customer Satisfaction	It is necessary to evaluate the customers' satisfaction to maintain the relationship with them.	Derived from P.CSF7
P.CSF10 – Supplier Relationship Management (SRM)	Use of SRM strategies by outsourcers to create a portfolio of suppliers/providers, keeping them closer.	Derived from P.CSF7
P.CSF11 – Use of the information system for Supplier Relationship Management	Use of SRM Information Systems, supporting P.CSF10 strategies.	Derived from P.CSF7
P.CSF12 – Provide adequate services and structured contract	The accomplishment of a set of contractual aspects defined previously (Similar to O.CSF4 in Table 2).	Derived from CA set and O.CSF4 in Table 2.
P.CSF13 – Advertising Strategies	Strategies related to the advertising by both companies in order to build their image in the market.	He et al. (2007).
P.CSF14 – Maintaining the companies' image in the market	After constructing their image, both companies must keep it using maintenance strategies.	Kasulis et al. (1999).
P.CSF15 – Sharing knowledge and experiences	Creation of an inter-organizational environment conducive to knowledge and experience sharing.	Lee et al. (2004); Lacity et al. (2009); Luo et al. (2010); Power et al. (2006); Betz et al. (2014); Kristjánsson et al. (2014); Chou et al. (2015).
P.CSF16 – Internal communication between the parties involved	Creation of inter-organizational communication channels to ensure information, knowledge and experience sharing.	Power et al. (2006); Goo & Huang (2008); Lacity et al. (2009); Liu et al. (2013); Kristjánsson et al. (2014).
P.CSF17 – Conducting self-assessment of performance in service delivery	Self-assessment in order to obtain measures about companies' own performance and knowledge acquisition in service delivery.	Komporozos-Athanasiou (2008).

Note. CA = contractual aspects; CSF = critical success factors; P.CSF = critical success factors for providers.

concepts related to ITO and contractual and relational governances. After the subsequent reading of the articles found, those with closer alignment to the thematic explored in this work were chosen. These articles supported the foundations of contractual and relational governance and the definition of the sets of constructs. These constructs were explored above and in Tables 1, 2 and 3, and the chosen works that were best aligned with them are listed.

The second phase consisted of the application of two thematic questionnaires containing a core of questions composed with the CA and CSF sets to be judged on an ordinal scale of importance: one to collect data about the outsourcers' perspective, applied between 2012 and 2013, and other relating to the providers perspective, applied between 2013 and 2014. Both questionnaires included questions with five-point scales of importance, adopting 1 (one) for

"insignificant" and 5 (five) for "very important." Respondents calibrated the intermediate values.

The companies that participated in this survey are entirely located in the metropolitan region of Recife, Brazil, where one of the country's most important IT poles is situated. Therefore, two distinct populations were utilized to define the sample, and 34 responses were obtained from the outsourcers and 16 from the providers during the data-collection period.

The data collected through the survey were organized and tabulated for use in the two subsequent phases. The third phase consisted of ranking problems (P.γ) over the elements from the CA and CSF sets, according to the companies' judgments, using a multicriteria outranking method that allowed the selection of the best-placed constructs in the ranking to follow into the next and last phase, the correlation analysis.
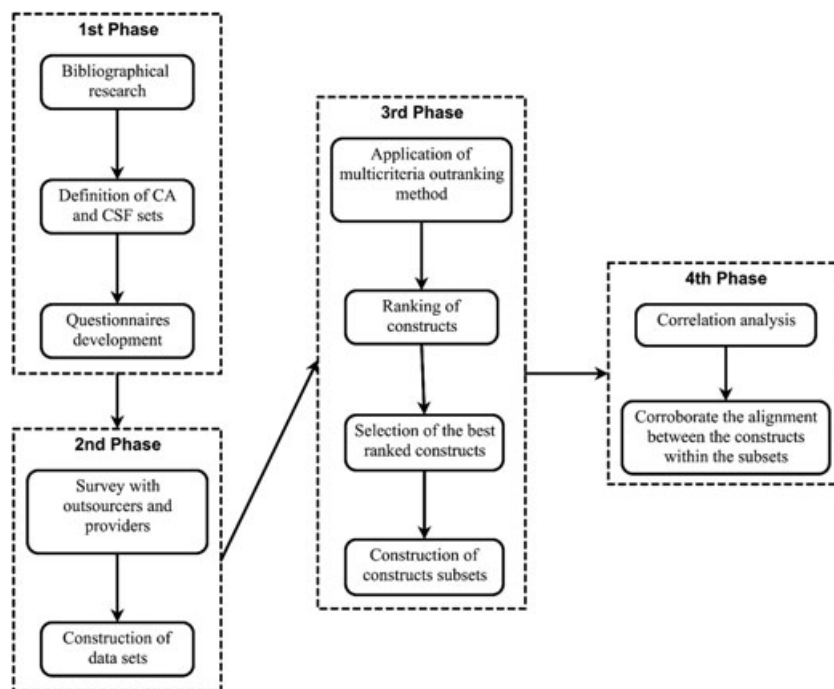
FIGURE 1 Flow chart of the research phases involved in the methodological approach. CA = contractual aspect; CSF = critical success factors.

In this phase, we used the Visual PROMETHEE Academic Edition software (Department of Quantitative Methods of Solvay Brussels School of Economics and Management, Free University of Brussels, Brussels, Belgium; Mareschal & De Smet, 2009).

Thus, the fourth and last phase of our methodological approach consisted of the application of correlation analysis within each selected construct subset to corroborate their alignment. Because the data collected were qualitative, the nonparametric Spearman's correlation test was applied in R language to verify the strengths of the correlations within each of the two construct subsets. It is worth mentioning that the tests were only performed within the framework of the individual perspectives of the outsourcer and provider and not between them. Figure 1 contains a flow chart of the methodological approach used here.

Below, we describe the details of the formal methods used for ranking the constructs and analyze the correlations between the selected ones.

3.1 | Ranking problems (P.γ) and the multicriteria PROMETHEE II method

The construct selection was considered as a multicriteria problem. Once the CA and CSF sets were judged on an ordinal importance scale, we were able to define the ranking problems (P.γ), according to Roy's (1996) problems classification. Ranking problems involve applying methods to generate a rank of alternatives, allowing decision makers to choose the best positioned alternative or alternatives to be implemented. Some outranking methods from the ELECTRE and PROMETHEE families were developed to handle this type of problem. We highlight three methods: ELECTRE II, and PROMETHEE I and II.

We consider applying the PROMETHEE II method, which has the following advantages over the ELECTRE II method, according to Brans and Vincke (1985):

- Higher sensitivity to small changes while ensuring a better understanding of the results; and

- Use of the most accessible parameters of positive, negative, and net flow representing the natural notion of preference intensity rather than the concordance, discordance, and discrimination thresholds of ELECTRE II, which are not easily understood by practitioners.

PROMETHEE I and II methods have similar assessment structures but differ in the number of relationship types: PROMETHEE I uses preference (P), indifference (I), and incomparability (R), whereas PROMETHEE II uses only former two (P and I). This minor difference means that PROMETHEE I provides more details about the relationships than PROMETHEE II, which suffers from an aggregation of certain distortions because it does not consider the incomparability (R) cases. However, PROMETHEE II allows the decision to be more easily understood. We will not consider the method choice further. Indeed, it is not our objective to develop a discussion regarding the adequacy of different methods; instead, we intend to demonstrate that multicriteria methods may be applied to support our methodological approach.

The PROMETHEE II method consists of two basic phases: one for outranking relation construction with aggregation between alternatives and between criteria and the other for exploring the relations.

Brans and Vincke (1985), Behzadian, Kazemzadeh, Albadvi, and Aghdasi (2010) and Silva and Costa (2014) present the PROMETHEE II procedure, which can be defined in the following steps:

Step 1. Determination of deviation based on pair-wise comparisons:

$$d_j(a, b) = g_j(a) - g_j(b), \qquad (1)$$

where $d_j(a,b)$ is the difference between alternatives a and b for each criterion.

Step 2. Application of a preference function:

$$P_j(a,b) = F_j[d_j(a,b)] \quad j = 1, \cdots, k, \tag{2}$$

where $P_j(a,b)$ is the preference for alternative a relative to that for alternative b for each criterion as a function of $d_j(a,b)$.

Step 3. Calculation of a global index of preference:

$$\forall a, b \in A \quad \pi(a,b) = \sum_{j=1}^{k} P_j(a,b) w_j, \tag{3}$$

where $\pi(a,b)$ of a over b (from 0 to 1) is the weighted sum of $P_j(a,b)$ for each criterion and w_j is the weight associated with the jth criterion.

Step 4. Calculation of positive and negative outranking flows:

$$\Phi^+(a) = \frac{1}{n-1} \sum_{x \in A} \pi(a,x), \tag{4}$$

$$\Phi^-(a) = \frac{1}{n-1} \sum_{x \in A} \pi(x,a), \tag{5}$$

where $\Phi^+(a)$ is the positive flow, and $\Phi^-(a)$ is the negative flow for each alternative.

Step 5. Calculation of the net outranking flow:

$$\Phi(a) = \Phi^+(a) - \Phi^-(a), \tag{6}$$

where $\Phi(a)$ is the net flow for each alternative.

In Step 2, in which the preference function is defined, the type of criterion must also be defined. Brans and Vincke (1985) defines six types of criteria: usual criterion, quasi-criterion, criterion with linear preference, level criterion, criterion with linear preference and indifference area, and Gaussian criterion. In this work, we considered the usual criterion defined by Equation 7:

$$P(x) \begin{cases} 0 & \forall x \leq 0, \\ 1 & \forall x > 0. \end{cases} \tag{7}$$

Preferences (P) and indifferences (I) are obtained from the following equations:

$$aPb \text{ if } \Phi(a) > \Phi(b), \tag{8}$$

$$aIb \text{ if } \Phi(a) = \Phi(b). \tag{9}$$

After applying the PROMETHEE II procedure, it is possible to obtain the ranking of the alternatives from the net flows, allowing the decision maker to more clearly see how an alternative or alternatives could be better implemented.

In this work, the multicriteria modeling of the decision problem considers the elements in the CA and CSF sets as the choice alternatives, and the criteria were the various respondent companies, with each weighted equally. Table 4 is the judgments matrix model for our decision problem.

TABLE 4 Judgment matrix model

	E1	Em
CA1 or CSF1	1st enterprise judgment for the 1st element of the set	mth enterprise judgment for the 1st element of the set
...	...	...
CAn or CSFn	1st enterprise judgment for the nth element of the set	mth enterprise judgment for the nth element of the set

Note. CA = contractual aspects; CSF = critical success factors.

3.2 | Correlation analysis in each selected element subset

The choice of elements in the previous phase produced a subset of elements within each CA, CSF, and RF set. To ensure the consistency of these subsets, we performed a correlation analysis. This type of analysis was possible because of the use of ordinal scales for importance and impact assessment.

The statistical correlation analysis considers the nonparametric Spearman's rank correlation test, which also provides a rank. Unlike the previous method, this rank contains the Spearman rho (ρ) coefficient, which reveals evidence of correlations between the chosen elements.

Therefore, Spearman's test measures the strength of the association between two variables based only on its posts. Spearman's coefficient is calculated using the following formula:

$$\rho = 1 - \frac{6 \sum_{i=1}^{n} d_1^2}{n(n^2 - 1)}, \tag{10}$$

where d_i is the difference between positions for case i, and n is the sample size. By applying this test, we were able to obtain a correlation matrix and construct the graphic network with the significant correlations.

It is also necessary to note that Spearman's test considers two hypothesis:

H0 $\rho_s = 0$ (There is no correlation between two variables);

H1 $\rho_s \neq 0$ (There is one correlation between two variables).

To obtain the graphs of correlation presented in Section 5, a succession of comparisons between each selected element will be performed.

4 | THE INTEGRATION PROCESS IN ITO RELATIONSHIPS

Before we introduce the ranking of the constructs, which was obtained via the multicriteria methodology presented above, we emphasize that a basic flow representing the cycle of interactions between the outsourcing parties and describing the initial understanding of the integration process exists. We propose this process in three main phases,
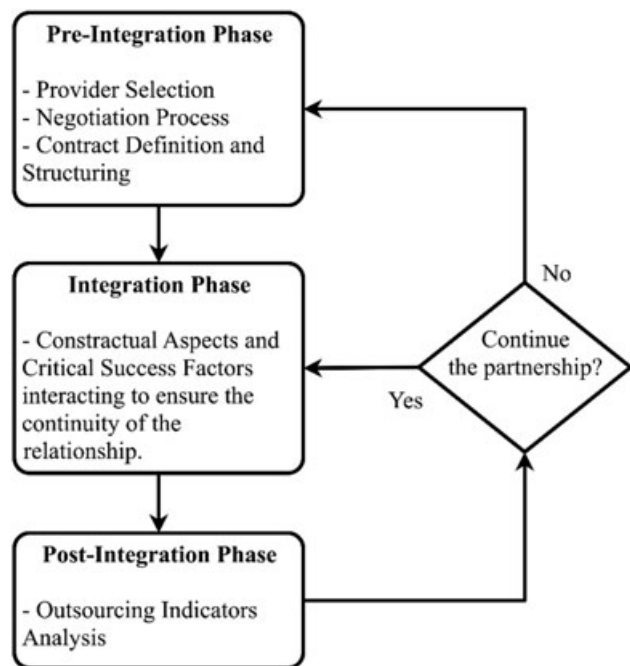
FIGURE 2 Outsourcing relationship integration process

based on Luo et al. (2010) description of the outsourcing integration process: a preintegration phase, an integration phase, and a postintegration phase. Figure 2 is a schematic representation of this process.

In the preintegration phase, provider selection and negotiation are used to define the contractual elements described previously, such as the service level, service duration, costs, penalties, and roles. After completing the negotiations, it is possible to structure the outsourcing contract as to guide the initial interaction between the two parties. The integration phase consists of the core integration process, in which all interactions necessary for confidence building occur. When confidence is beginning to be established, contractual elements provide guidelines for the relationship building. In the postintegration phase, each side of the outsourcing relationship performs indicator analyses to decide if the partnership should continue or not.

4.1 | Outsourcing relationship construct ranking and selection

By applying the PROMETHEE II method, we obtain the ranking within each set of constructs. As explained in Section 3.1, the net flow (Φ) is the final element of the method and is the parameter used to define the alternative position. Table 5 shows the PROMETHEE II ranking table for providers' CA elements.

Only CA exceeding zero were entered into the integration process:

1. CA2—Detailed contract

2. CA6—Costs

3. CA1—Service level agreement

This prioritization demonstrates that the service providers consider a well-organized and structured contract to be essential for

TABLE 5 Providers' CA ranking

Position	CA	Φ	Φ +	Φ −
1	CA2	0.2875	0.325	0.0375
2	CA6	0.2375	0.2875	0.0500
3	CA1	0.2125	0.3125	0.1000
4	CA5	−0.1000	0.1750	0.2750
5	CA3	−0.3125	0.1000	0.4125
6	CA4	−0.3250	0.1250	0.4500

Note. CA = contractual aspects.

successful outsourcing. There is also concern regarding the costs involved, and thus, the providers should be careful not to extrapolate the values defined in the contract. The definition of service level refers to the fact that the outsourcer should provide a detailed description of services, including the objectives, goals, and responsibility for the services to be outsourced.

Table 6 shows the PROMETHEE II ranking table for providers' CSF elements.

Using the same parameters of choice, the P.CSF includes more selected elements (again, those exceeding zero). The chosen P.CSF were as follows:

1. P.CSF2—Well-structured planning for services to be provided

2. P.CSF1—Commitment from managers of outsourcer companies

3. P.CSF16—Internal communication between the parties involved

4. P.CSF7—Customer relationship management

5. P.CSF14—Maintaining the company's image in the market

6. P.CSF3 —Flexibility of staff to develop activities related to services

TABLE 6 Providers' CSF ranking

Position	CSF	Φ	Φ +	Φ −
1	P.CSF2	0.4492	0.4844	0.0352
2	P.CSF1	0.3984	0.4531	0.0547
3	P.CSF16	0.2852	0.3984	0.1133
4	P.CSF7	0.1602	0.3242	0.1641
5	P.CSF14	0.1094	0.293	0.1836
6	P.CSF3	0.1016	0.2656	0.1641
6	P.CSF5	0.1016	0.2813	0.1797
7	P.CSF4	0.0859	0.2500	0.1641
8	P.CSF9	0.0469	0.2695	0.2227
9	P.CSF6	0.0391	0.2344	0.1953
10	P.CSF12	0.0273	0.2344	0.207
11	P.CSF17	−0.0508	0.1875	0.2383
12	P.CSF10	−0.1914	0.1406	0.3320
13	P.CSF8	−0.2148	0.1523	0.3672
14	P.CSF15	−0.3164	0.1172	0.4336
15	P.CSF11	−0.4336	0.0898	0.5234
16	P.CSF13	−0.5977	0.0820	0.6797

Note. CSF = critical success factors; P.CSF = critical success factors for providers.

7. P.CSF5—Providers' staff training

8. P.CSF4—Adaptability to possible changes in the services

9. P.CSF9—Evaluation of customer satisfaction

10. P.CSF6—Documentation of all activities performed and services provided (organizational memory)

11. P.CSF12—Provision of adequate services and structured contract

Note that in Table 6, P.CSFs 3 and 5 obtained the same net flow, becoming tied in 6th place. According to these results, the well-structured planning of services to be provided allows for the execution of these services to reach the level of quality required for future continuation of the outsourcing contract. It is also important that the managers of the outsourcer companies are cooperative in the development of outsourced activities, providing the necessary information and maintaining the appropriate level of communication to allow the provider to develop their activities.

Regarding the evaluation of outsourcers' side results, Table 7 shows the PROMETHEE II ranking table for their CA elements, with the selected elements being those greater than zero.

The subset of CA obtained with the PROMETHEE II application includes the following:

1. CA6—Costs

2. CA1—Service level agreement

3. CA2—Detailed contract

4. CA 4—Definition of penalties for low performance and information violations

Clearly, for the contractors, the costs are of primary importance, followed by the definition of service level, the contract definition itself, and finally, the penalties to be applied to both parties for noncompliance regarding some of the contractual elements.

Table 8 shows the PROMETHEE II ranking table for outsourcers' CSF elements.

In the O.CSF set, only two elements were chosen:

1. O.CSF2—Alignment of outsourcers' and providers' objectives

2. O.CSF1—Selection of the correct provider

In practice, the two O.CSF elements have a reciprocal relationship: When the provider's level of understanding of the outsourcer's

TABLE 7 Outsourcers' CA ranking

Position	CA	Φ	Φ +	Φ –
1	CA6	0.1824	0.2941	0.1118
2	CA1	0.0765	0.2294	0.1529
3	CA2	0.0706	0.2471	0.1765
4	CA4	0.0059	0.200	0.1941
5	CA3	−0.0882	0.1706	0.2588
6	CA5	−0.2471	0.0941	0.3412

Note. CA = contractual aspects.

TABLE 8 Outsourcers' CSF ranking

Position	CSF	Φ	Φ +	Φ –
1	O.CSF2	0.1176	0.1765	0.0588
2	O.CSF1	0.0956	0.1912	0.0956
3	O.CSF4	−0.0074	0.1397	0.1471
4	O.CSF3	−0.0221	0.1250	0.1471
5	O.CSF5	−0.1838	0.0882	0.2721

Note. CSF = critical success factors; O.CSF = critical success factors for outsourcers.

outsourcing goals is higher, the choice of the provider can be considered to be more appropriate.

5 | CORRELATION ANALYSIS OF THE CONSTRUCT SUBSETS

Correlations analysis using Spearman's test is applied to visualize the significant relationships between the chosen elements, corroborating the positive relationships between the constructs selected to compose the subsets via multicriteria analysis.

The Spearman's tests generated correlation matrixes allowing the creation of correlation graphs, demonstrating the significant correlations between the constructs. The following text describes each of these graphs for each side of the outsourcing relationship.

5.1 | Providers' side

For the providers' side, Spearmans' test considers a sample size of $n = 16$ and a significance level of $\alpha = 0.05$ such that the critical value for the test's statistics was $\rho_s = 0.503$. Figure 3 presents the graphic obtained for the CA subset, including the significant correlations and their values.

The results indicate that all elements of the CA subset exhibit strong positive correlations, corroborate the notion that the "service level agreement" (CA1), "detailed contract" (CA2), and "costs" (CA6) are both important elements between CA sets and have a strong explanatory power. This suggests that a detailed contract should include a precise description of the service level agreement, defining all the elements, characteristics, costs, and comprehensiveness necessary for successful outsourcing.
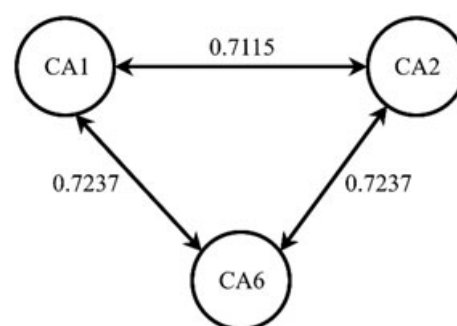

FIGURE 3 Graphic showing correlations for the critical success factors (CA) subset from the providers' perspective
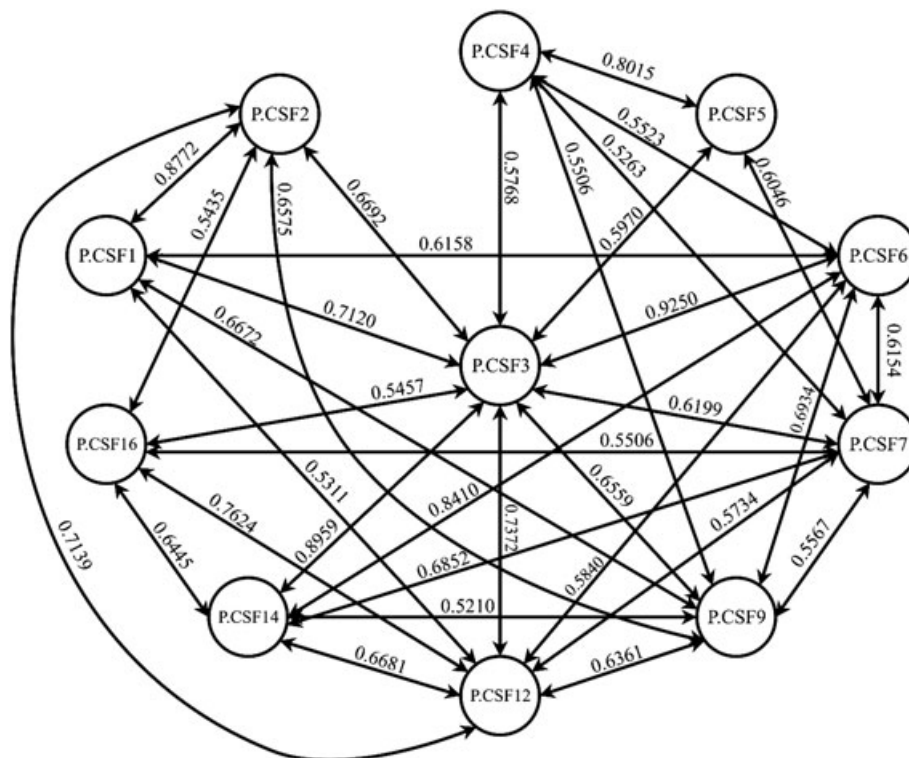
FIGURE 4 Graphic showing the correlations for the critical success factors (CSF) subset from the providers' perspective

Figure 4 is a graphic showing the significant correlations between the elements of the P.CSF subset.

This graphic shows that P.CSF3—Flexibility of staff to develop activities related to services is correlated with all other P.CSF. Thus, a team of service developers capable of being readily flexible and responsive to changes may deliver services adequate to meet outsourcers' requirements and still respond with quality work, satisfying the profile sought by the outsourcers.

The two strongest correlations in this graphic also involve P.CSF3: P.CSF3–P.CSF6 and P.CSF3–P.CSF14. A relationship between P.CSF3 and P.CSF6—Documentation of all activities performed and services provided (organizational memory) clearly exists, which seems quite logical because flexibility is made possible by a good understanding of what will be developed by the work teams. Such a relationship is favored by an organizational memory containing descriptions of elements related to this work and showing how to resolve possible problems. P.CSF3 also exhibits a very strong relationship with P.CSF14—Maintaining the companies' image in the market, which can be explained by both parties' (but principally the providers) need to maintain their good image to attract versatile professionals, thus, ensuring the existence of flexible teams.

Three P.CSF relate to maintaining relationships and customer satisfaction: P.SCF16—Internal communication between the parties involved, P.CSF7—Customer relationship management, and P.CSF9—Evaluation of customer satisfaction.

Other relationships that may be highlighted are those between flexibility of the staff in developing activities related to services (P.CSF3), providers' staff training (P.CSF5), and adaptability to possible changes in the services (P.CSF4). These describe the potential of the staff to develop and execute the outsourcing activities in an environment of continuous change while under pressure and still achieve the goals within the stipulated time.

P.CSF6—Documentation of all activities performed and services provided (organizational memory)—is an important issue because it allows the creation of a database of lessons learned and good practices that can be accessed by the entire institution, ensuring that some previous problems and errors can be avoided in the future or addressed in a contingency plan. Finally, is important to mention that P.CSF12—Provide adequate services and a structured contract—directly influences P.CSF2—Well-structured planning for services to be provided—because it is responsible for providing the initial information supporting the planning of the services.

5.2 | Outsourcers' side

The outsourcers' perspective involved a more restricted set of elements considering their size. Thus, the number of correlated elements was lower than for the providers' perspective. Spearman's test considers a sample size of $n = 34$ and a significance level of $\alpha = 0.05$. The critical value for test statistics was $\rho_s = 0.341$. The number of elements was smaller, but the number of respondent companies was larger. Figure 5 presents the graphic for the CA subset from the outsourcer's perspective.

This graphic demonstrates that all the CA are related to each other. We emphasize the description of the outsourcers' side provided above. Detailed contracts require well-defined elements, such as service level, penalties, and costs, to ensure that the outsourcing process
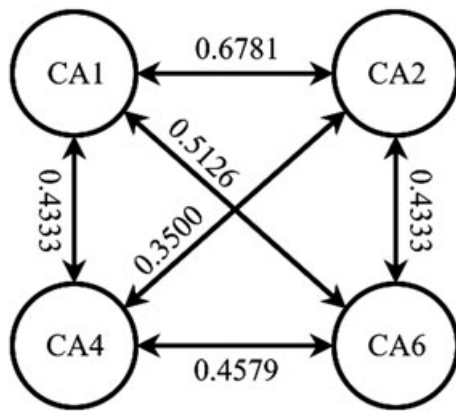
FIGURE 5 Graphic showing correlations for the contractual aspects (CA) subset from the outsourcers' perspective
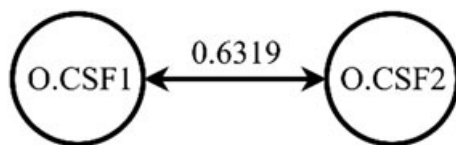

FIGURE 6 Graphic showing the correlations for the critical success factors (CSF) subset from the outsourcers' perspective

and services delivery are achieved without additional costs and that appropriate penalties are applied in case a breach of contract occurs.

Figure 6 gives the graphic obtained for the outsourcers' CSF subset.

Here, we note that the selection of the correct provider (O.CSF1) is confirmed by the provider's concern about the outsourcer's objectives and his attempts to strategically align his own objectives with those of his customer, which presupposes O.CSF2—Alignment of outsourcers' and providers' objectives.

6 | DISCUSSION

The ranking obtained by applying PROMETHEE II enables the selection of those elements with more influence on the integration process in outsourcing relationships. To consolidate and develop this relationship, outsourcers and providers require a number of cycles of interaction that allow the collaboration between them to be improved. We assume that the first interactions between the parties being with defining CA, given the power contracts exert in guiding the initial relationship.

Immediately following CA, CSF predict breakthroughs in the outsourcing relationship, where in addition to the contractually defined elements, both companies seek mutual understanding and more effective sharing of information, knowledge, and experience. Communication, although not considered to be the most important CSF, is one of the three most important from the providers' perspective and plays an important role in integration, providing a medium for information and knowledge sharing. According to the findings from our literature search, we can designate knowledge sharing and

communication as connective factors during the outsourcing process (Betz, Oberweis, & Stephan, 2014; Kristjánsson, Helms, & Brinkkemper, 2014).

This conclusion is supported by Goo and Huang (2008), who established the necessity of a communication plan in CA definition as an approach to disseminate contractual information for all parties involved in the relationship. Lacity et al. (2009) includes communication as a determinant element in relational governance for ITO.

Correlation analysis emphasizes the positive relationship between the elements (constructs) in the subsets, providing statistical evidence that they are explanatory in Recife's IT Pole and allowing us to understand which of these elements may be considered relevant to the outsourcing relationships and development of partnerships between the companies in this pole.

7 | CONCLUSION

This work focused on a methodology based on initial data collection, the application of multicriteria analysis to obtain a ranking of elements in terms of their importance defined by outsourcer and provider companies in the IT area, and correlation analysis of the elements chosen from the ranking.

We believe this work provides three important contributions regarding outsourcing areas for practitioners and researchers. The first contribution includes the results of the literature search. These findings define the sets of constructs (CA and CSF elements) that may be used by companies involved in an outsourcing process as criteria to improve their relationships. Second, we strengthened the integrated methodological approach by combining the use of a ranking method and a correlation analysis of data collected from the outsourcers and providers of Recife's IT pole. Finally, we explained how the elements selected from the ranking interact with each other within their specific subset based on the importance data revealed by the correlation analysis.

Indeed, combining these three contributions provides a better understanding of the path to be followed to establish a partnership and the main elements to be considered in this path based on the premise that the relationship between outsourcers and providers is exhibits an interaction cycle. The three-phase outsourcing relationship integration process clarifies this cycle of interactions, and we hope that this construct will support companies in strengthening their organizational strategic practices for outsourcing and other related research.

The development of this research revealed a series of limitations in different areas. The first occurred in the data-collection phase: It was very difficult to access the outsourcers and providers to perform the survey. Another limitation is that this work did not attempt to find correlations between the sets or subsets but only within them. Our idea was to verify that each selected construct was positively related to its possible pairs, confirming its suitability for membership in the set to which it was conceptually allocated.

The research was restricted by the geographic region in which it was performed: the Recife metropolitan region. Therefore, the results of the methodological approach cannot be generalized to other geographic areas.

This work opens up possibilities for future research focusing on the interaction between the two sides of the outsourcing process, such as (a) defining and studying an integration model using game theory, (b) testing the strength of correlations by crossing the outsourcers' and providers' perspectives, (c) more accurately analyzing the importance of CA and CSF by applying other multicriteria problems and methods and performing sensitivity analysis (scenario variation), and (d) including risk factors for the outsourcing relationship and testing their influence on the CA and CSF.

Another important consideration for further work is the use of unified sets of CA, CSF and risk factors for both perspectives (outsourcers and providers). This could allow the development of an integration model to align the two parties regarding the maturity of the relationship.

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