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ABSTRACT

Due to the ever changing Information Technology (IT) and the subsequent complexity of know-how management, many organizations may want to delegate IT works to third parties. However, in the practice this poses many risks that can threat the success a company may expect from IT Outsourcing. This paper identifies a number of risks associated to this kind of services and proposes a mitigation strategy by means of a model that identifies and puts into operation a set of Critical Success Factors (CSF), from the perspective of both the client and the supplier. The model is used to determine which are the critical CSFs regarding the risks faced by an IT Outsourcing project. In addition, the application and evaluation of the CSF model proposed are shown by means of a case study.

Keywords

Information Technology Outsourcing Risk, Critical Success Factors, Information Technology Outsourcing, Risk Mitigation.

INTRODUCTION

Definitions of Information Technology Outsourcing (ITO) by Kilby (1993), Domberger (1998), Ketler and Willems (1999), and Kraker (1995) highlight the relationship or deal established between a company and an outside provider. In this context the provider is responsible for supplying the resources necessary to meet the requirements so that the current management is able to improve activities related to IT and Information Systems (IS).

Kraker (1995) adds that ITO is not longer limited to the transfer of functions and responsibilities, but also involves the use of knowledge, experience and creativity of outside providers. In this regard, it can be concluded that ITO *is the contractual relationship according to which an outside organization assumes full or partial responsibility for performing all or a part of the IT functions in a company, making use of its knowledge, experience, and creativity to provide the client with a high quality service; this relationship can imply a partial or total transfer of personnel and/or resources.*

There is no silver bullet that makes it possible for all ITO projects to culminate successfully. However, there are multiple factors that can contribute to their successful development from both perspectives (client and provider). These factors can help managers specify their own information needs regarding those aspects that are critical for their contractual relationship. Rockart (1979) proposed the idea of Critical Success Factors (CSFs) as the key areas where favorable results are absolutely necessary if management objectives are to be achieved.

In this sense, the use of CSFs can come to be a strategy to manage risks that may appear in an ITO. To concrete the relationship between Risk and CSFs within the ITO, this research is aimed at identifying the most common risks and developing a CSF model that can be used by both client and provider as a guide to face the challenges and difficulties inherent to this service.

To do this, the Systemic Methodological Framework for IS Research was used. This Framework is based on the Action Research method and combined with DESMET methodology. This framework is systemic because: it considers the contextual conditions of the research, is flexible with respect to the studied object, and is able to import or exclude techniques, instruments or relations in every instantiation. More than thirty case studies have been applied and five research areas have been consolidated (Pérez et al., 2004).In addition, the Goal Question Metric (GQM) methodology, proposed by Basili et al. (1994), was employed for the CSF operationalization. Based on this methodology, each CSF was defined as a goal. Questions and metrics were proposed for each one of these goals to quantify the status of the CSFs within an ITO project.

This paper first presents the number of risks associated to ITO; then a CSF model is proposed for ITO and the Risk-CSF relationships as well as the evaluation method selected to validate the model proposed through a Case Study. Finally the results are shown followed by conclusions and recommendations.

IT OUTSOURCING RISKS

There are in the practice multiple risks that can limit IT Outsourcing. Table 1 shows 11 risks considered the most relevant that may appear in the implementation of an ITO Project.

Risk	Definition
Possibility of a management weakness	Regardless of the outsourcing option that a company may choose, the provider company should have managers knowledgeable about the administration of system operations and contracts and capable of establishing relationships with third parties.
Personnel without experience	The most specialized service provider does not always have the most prepared and specialized personnel, which is a significant factor for Outsourcing.
Business uncertainty	A company that makes the decision of using ITO should be certain of its future direction and its long-term needs.
Outdated technological tools	How can a company be sure that its provider is always technologically updated? A provider must be permanently innovating its IT capabilities
Uncertainty isolated cases	IT projects are generally associated to some degree of uncertainty. Companies should avoid rigid Outsourcing contracts; instead they should sign contracts with variation clauses, which are revised annually, so that they can be adjusted to changes occurring in the companies.
Hidden costs	There are two trends: First, companies that underestimate implementation costs; the second are companies that underestimate administration and management costs of the project.
Lack of an organizational learning	Organizational learning is very important for mastering an application, because management tends to learn and appraise IT applications by using them and perceiving future development opportunities. It is recommended to transform the relationship with the provider from a business contract into a strategic association.
Loss of innovation capacity	This capacity is diminished when Outsourcing is contracted, because dedicated resources are required to develop smooth organizational processes and experimental and enterprising competencies, and this is not possible with service providers.
Danger of the eternal triangle	In their contractual relationship some companies use an intermediary or a consultant that represent an additional actor, being thus necessary to pay attention to the costs and complexity associated to this scheme.
Technological indivisibility	Given the specific nature of the company in its desktop domain, it is recommendable to think twice before deciding to turn to Outsourcing in this and other IT indivisible areas.
Unclear approach	The provider does not bother either to present acceptable and innovative ideas or to assume the commitment required for the implementation of systems, much less for the reaping and delivery of IT benefits.

Table 1. Risks of IT Outsourcing (Benoit et al., 2001)

These risks do not appear in every Outsourcing decision, but are not unusual. The common reasons for an ITO service are cutting costs, keeping the business approach, and subcontracting inherited systems. In spite of the risks and complexity that Outsourcing implies, experience can suggest that advancing a process included in the company strategy can represent multiple sustainable competitive advantages. Is it feasible to develop a model based on a set of CSFs which can faithfully represent the current status of an ITO project? How can this model be put into operation so that it can give some orientation about the quality of the service provided?

IT OUTSOURCING CSFs

Considering the categories proposed by Shuen (2002) for his CSFs (Efficient Management, Client-Provider Relationship, Efficient, Good Contract, Provider Competence) as well as the conditions suggested by Bakehouse et al. (2001) to successfully implement information technologies (Commitment, Coordination, and Communication), and adding CSFs proposed by other authors, CSFs are categorized for IT Outsourcing as shown in Figure 1.
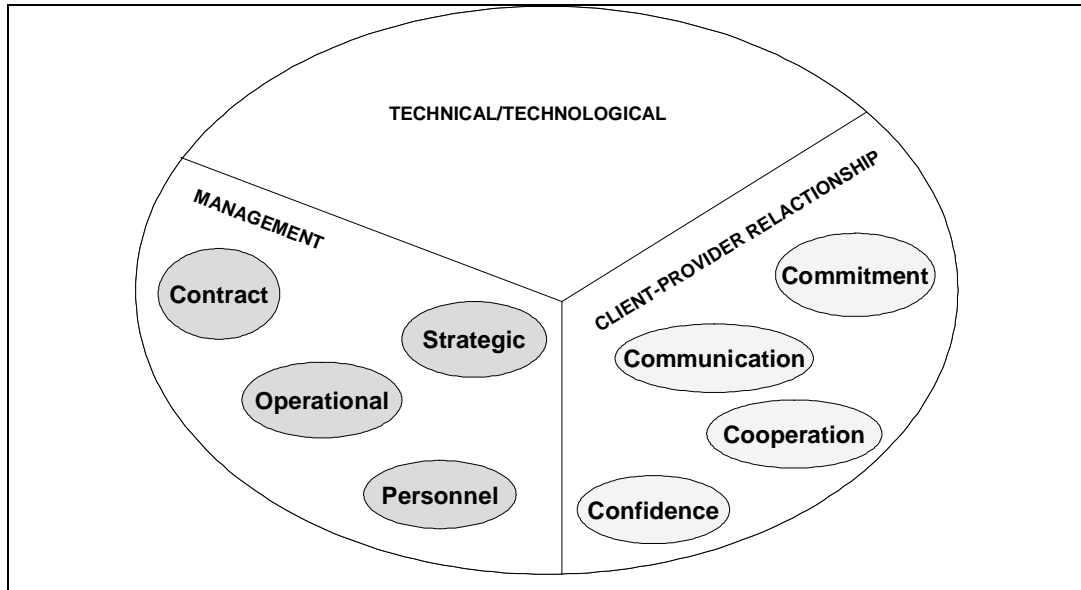

Figure 1. CSF Category and Subcategory

Some authors have listed and described a considerable number of CSFs for ITO; many of the CSFs proposed are named differently, although they are similar. According to their purpose, they can be grouped under one same CSF. The tables below include the definition of each CSF per subcategory, showing also the authors that have proposed it.

#	STRATEGIC MANAGEMENT CSF	Definition
1	Strategic approach (a) Focusing on the strategy (Shuen, 2002) (b) Strategic approach (Quinn, 1999) (c) Having a vision and a strategic plan (Ugalde, 2000)	Planning ITO with a vision and a strategy consistent with the goals of both the client and the provider is critical. The client should also be able to focus its resources on the organization core business.
2	Long-term relationships (a) Development of a multi-annual plan for Outsourcing relationship (McClure, 2001) (b) Choosing long-term relationships (Matlus and Maurer, 2002)	Both the client and the provider should try to establish a long-term relationship, so that a common vision and strategy, as well as the cooperation and confidence required for the success of the project can be developed.
3	Outsourcing as an intellectual asset (a) Outsourcing as an intellectual asset, not only a matter of costs (Quinn, 1999)	ITO should be seen as a tool for strategic improvement and for the Client's business processes.
4	Separation of short-term and long-term goals (a) Short-term goals should be separated from long-term goals (Vowler, 1992)	Establishing a balanced number of both short-term and long-term goals is critical, so that results can be perceived from the beginning and the commitment and collaboration between both organizations can be established from the beginning of the project.
5	Jointly establishing business orientation (a) Common goals (Goolsby, 2002) (b) Work jointly to determine business orientation (McClure, 2001)	Business orientation based on the setting of the project goals and objectives should be a process in which both organizations should be involved, so that realistic goals and objectives are set in accordance with the interests of both organizations.

Table 2. CSF – Management Category – Strategic Subcategory

#	PERSONNEL MANAGEMENT CSF	Definition
6	Focusing on the employees (a) Focusing on the employees (Shuen, 2002) (b) Management of personnel issues (Moad, 1997) (c) Communicating with employees (Roberts, 1999) (d) Continuous communication with employees (Quinn, 1999) (e) Special attention to personal matters (Ugalde, 2000) (f) Personnel management (Cullen et al., 2001) (g) Strong relationships with personnel (Cullen et al., 2001) (h) Keeping employees focused (Komninos, 2002)	A good management regarding all the client's and provider employees involved in the project is necessary. The appointment of employees with appropriate knowledge is critical to properly handle any personal problem that may arise and keep employees focused and satisfied with their tasks.
7	Managing resistance to change and promoting the Outsourcing idea (a) Managing resistance to change (McClure, 2001) (b) Expect and accept resistance to change (Matlus and Maurer, 2002) (c) Having a team promoting the Outsourcing idea (McClure, 2001)	The benefits the project implies for both the client's organization as well as its employees have to be properly promoted, so that any degree of resistance to change can be minimized. This has to be managed correctly.
8	Team work promotion (a) Promoting team work (Komninos, 2002)	All activities of the ITO project should be carried out in team work, to guarantee that if any of the members of the team is replaced or reassigned, tasks can proceed smoothly. In addition, team work contributes to a better knowledge transfer among team members.

Table 3. CSF – Management Category – Personnel Subcategory

#	OPERATIONAL MANAGEMENT CSF	Definition
9	Management control (a) Management control (Shuen, 2002)	Management control throughout the project should be efficiently measured, as well as the use of common practices for management control.
10	Delivery performance (a) Delivery performance (Cullen et al 2001)	The quality of the products and services supplied by the provider to the customer should be measured as well as whether products are delivered on schedule.
11	Cost management (a) Cost management (Cullen et al., 2001)	Costs incurred should be efficiently controlled as well as their relation to planned costs, so that hidden costs can be controlled and costs are kept as planned.
12	Development and use of best practices (a) Development and use of best practices (Quinn, 1999)	The best industrial practices for the different activities should be followed. In addition, maturing process of the activities carried out should be used to develop new practices and improve those practices used so far.

Table 4. CSF – Management Category – Operational Subcategory

#	CONTRACT MANAGEMENT CSF	Definition
13	Efficient contract control (a) Efficient contract control (Shuen, 2002) (b) Good contract management (Cullen el al., 2001)	The fulfillment of the agreements, terms and responsibilities set forth in the contract should be efficiently controlled.
14	Clear points between client and provider (a) Clear definitions (Shuen, 2002) (b) Clear points with the provider (Goolsby, 2002)	All the terms, conditions and responsibilities set forth in the contract should be clearly specified, so that both the client as well as the provider should know which are their duties and responsibilities.
15	Flexibility (a) Flexibility (Shuen, 2002) (b) Be flexible (Cullen et al., 2001) (c) Development of strategies and a flexible contract, adjustable to the business changes (McClure, 2001)	The ITO contract should be flexible enough to be adapted to the evolution, maturing and changes in the business so that conditions and responsibilities can be adjusted over time.
16	Use of SLA (a) Use of SLA (Cullen et al., 2001)	Service Level Agreements should be used to specify the quality and performance level expected in the services offered by the provider.

Table 5. CSF – Management Category – Contract Subcategory

#	CLIENT-PROVIDER RELATIONSHIP COMMITMENT CSF	Definition
17	Efficient knowledge sharing (a) Information exchange (Roberts, 1999) (b)Efficient knowledge sharing (Fielden, 2002)	Both organizations (client and provider) should be capable of establishing mechanisms for efficient information and knowledge exchange if IT Outsourcing is to be successful.
18	Cooperation between organizations (a) Interdependence (Shuen, 2002) (b) Cooperation between organizations (Anthony, 2000)	IT Outsourcing success is determined by the cooperation degree existing between client and provider.

Table 6. CSF – Client-Provider Relationship Category – Commitment Subcategory

#	CLIENT-PROVIDER RELATIONSHIP COMMUNICATION CSF	Definition
19	Understanding between both organizations (a) Clear understanding (Shuen, 2002) (b) Understanding the needs and objectives of the client (Ugalde, 2000) (c) Understanding the client (Cullen et al., 2001) (d) Understanding both organizations (Higgins, 2002) (e) Understanding the client's needs (Komninos, 2002)	A communication allowing a clear understanding between both parties, from the client's needs, goals and objectives to the scope of the activities, is critical for the success of IT Outsourcing.
20	Keeping active communication lines (a) Efficient communication (Shuen, 2002) (b) Efficient relationship between managements (Shuen, 2002) (c) Efficient communication (Lee, 1995) (d) Communication (Cullen et al., 2001) (e) Two-way communication at each level (Warren, 2001) (f) Communication as a key factor (Komninos, 2002) (g) Keeping the whole organization informed (McClure, 2001) (h) Keeping active communication lines (McClure, 2001)	An active two-way communications is important to timely communicate any incident occurred during the implementation of the project.

Table 7. CSF – Client-Provider Relationship Category – Communication Subcategory

#	CLIENT-PROVIDER RELATIONSHIP COOPERATION CSF	Definition
21	Relationship as a marriage rather than a contract (a) Alliance (Shuen, 2002) (b) Relationship as a marriage rather than a contract (Roberts, 1999)	The client-provider relationships should reach a commitment level between both parties, which goes beyond a mere contract and becomes an alliance, a quasi-marital relationship; this will allow organizations to establish the confidence level required.
22	Professional individuals (a) Focusing on the provider (Shuen, 2002) (b) Professional providers (Shuen, 2002) (c) Professional individuals (Shuen, 2002)	All the individuals involved in the project should exhibit a proper professional level, establish a proper communication and be responsible regarding their commitments (meetings, etc.).
23	Setting penalties and developing incentives (a) Setting penalties and developing incentives (Goolsby, 2002)	Penalties and incentives that motivate organizations to meet the service levels agreed upon should be established. The expected quality level should be surpassed whenever is possible.
24	Union of both managements to support the project (a) Support by senior management (Ugalde, 2000) (b) Ensuring support by senior executives (McClure, 2001) (c) Union of both managements to support the project (McClure, 2001) (d) Support at the directive level (Matlus and Maurer, 2002)	Top executives and managers of both organizations should be capable of committing with the fulfillment, follow-up and control of the agreement reached.
25	Considerable investment of time and effort (a) Considerable investment of time and effort (Warren, 2001) (b) Periodical meetings (McClure, 2001)	Both organizations should be clear as to the time that should be invested and the effort levels that each one should assume to attain their goals, as well as the co-responsibility and commitment of every company with the tasks assigned.
26	Risk sharing (a)Risk sharing (Warren, 2001)	In the relationship established risks should be shared equally between both organizations so that the project is not abandoned because risks inherent to it are not identified.

Table 8. CSF – Client-Provider Relationship Category – Cooperation Subcategory

#	CLIENT-PROVIDER RELATIONSHIP CONFIDENCE CSF	Definition
27	Confidence between both parties (a) Confidence between both parties (Higgins, 2002)	Client and provider should trust each other to guarantee information exchange and timely cooperation in the resolution of problems.

Table 9. CSF – Client-Provider Relationship Category – Confidence Subcategory

#	TECHNICAL/TECHNOLOGICAL CSF	Definition
28	Expertise and technical knowledge (a) Technical expertise (Cullen et al., 2001)	The personnel should have enough expertise and technical knowledge in the different areas and activities they perform.
29	Keeping a high innovative capacity regarding service and technological advantages (a) Keeping a high innovative capacity regarding service and technological advantages (Shuen, 2002)	Long-term planning depends on the capacity of both the provider and the client to adapt themselves to and implement, as the case may be, the continuous changes in IT area.

Table 10. CSF – Technical/Technological Category

Once each CSF was defined for the IT Outsourcing, how do you know if the CSF is at an acceptable level to guarantee the success of the project? How can the CSF be measured? These questions were answered by means of the GQM methodology (Basili et al., 1994), which serves to establish measurement, parametrization and operationalization of the CSF proposed before. These CSFs together make up the model based on the CSF proposed. Due to space restrictions, Table 11 shows an

example of how this approach was presented for each CSF. Each one of them represents a *Goal*; to reflect their fulfillment, one or more *Questions* are made, which, in turn, have a score table associated (linkert or flag) for each answer (*metrics*). Each question can be answered by the Client, the Provider or both.

Goal (G)	Question (Q)	Metric (M)		Provider	Client
		Name	**Formulation**		
Understanding both organizations (number 19 in Table 7)	Are there proper means that can be used to establish an efficient communications between both companies?	Number of effective communications lines	0 communication line à 1 1 communication line à 2 2 communications lines à 3 3 communications lines à 4 more of 3 communications lines à 5	X	X
	How many periodical meetings are held in which information on the current status and partial results of the project is exchanged between both companies?	Monthly frequency of these meetings	none à 1 1 meeting à 2 2 meetings à 3 3 meetings à 4 4 or more meetings à 5	X	
	Is the company really informed about what does the implementation of the Outsourcing service mean?	Percentage of individuals that know the objectives, benefits and implications of contracting the Outsourcing service	0-20% à 1 21-40% à 2 41-60% à 3 61-80% à 4 81-100% à 5		X

Table 11. GQM for CSF # 19 of the Client-Provider Relationship category; Communication subcategory

Once operationalization of CSF was established using GQM, it was possible to propose a model consisting of twenty-nine (29) CSFs for the ITO and 69 metrics that can be used to measure the CSFs. The Risk-CSF relationship in an ITO is presented below. This relationship establishes a mitigation strategy of the most common risks in the implementation of this kind of projects and how can these risks be prevented and faced through the fulfillment of the CSF associated to them.

CSFs PROPOSED AS A RISK MITIGATION STRATEGY IN IT OUTSOURCING

Figures 2, 3 and 4 show the CSFs that can be used to mitigate each one of the risks associated to the ITO. It can be observed that:

- One CSF can mitigate one or more risks in each subcategory, such as in the Strategic subcategory of the Management category; the fulfillment of the *Jointly Establishing Business Orientation* CSF has a favorable impact on risks: Management weakness, the provider may become a competitor and give rise to business uncertainty.

- One CSF can mitigate one or more risks, such as in the Operational subcategory of the Management category: the *Saved Cost*s risk is not as expected; it can be mitigated by three CSFs (Cost Management, Management Control and Delivery Performance).

- There are risks that repeat themselves in several subcategories within a category. For instance, the *Isolated Uncertainty Cases* risk is present in the Personnel and Contract subcategories of the Management category.
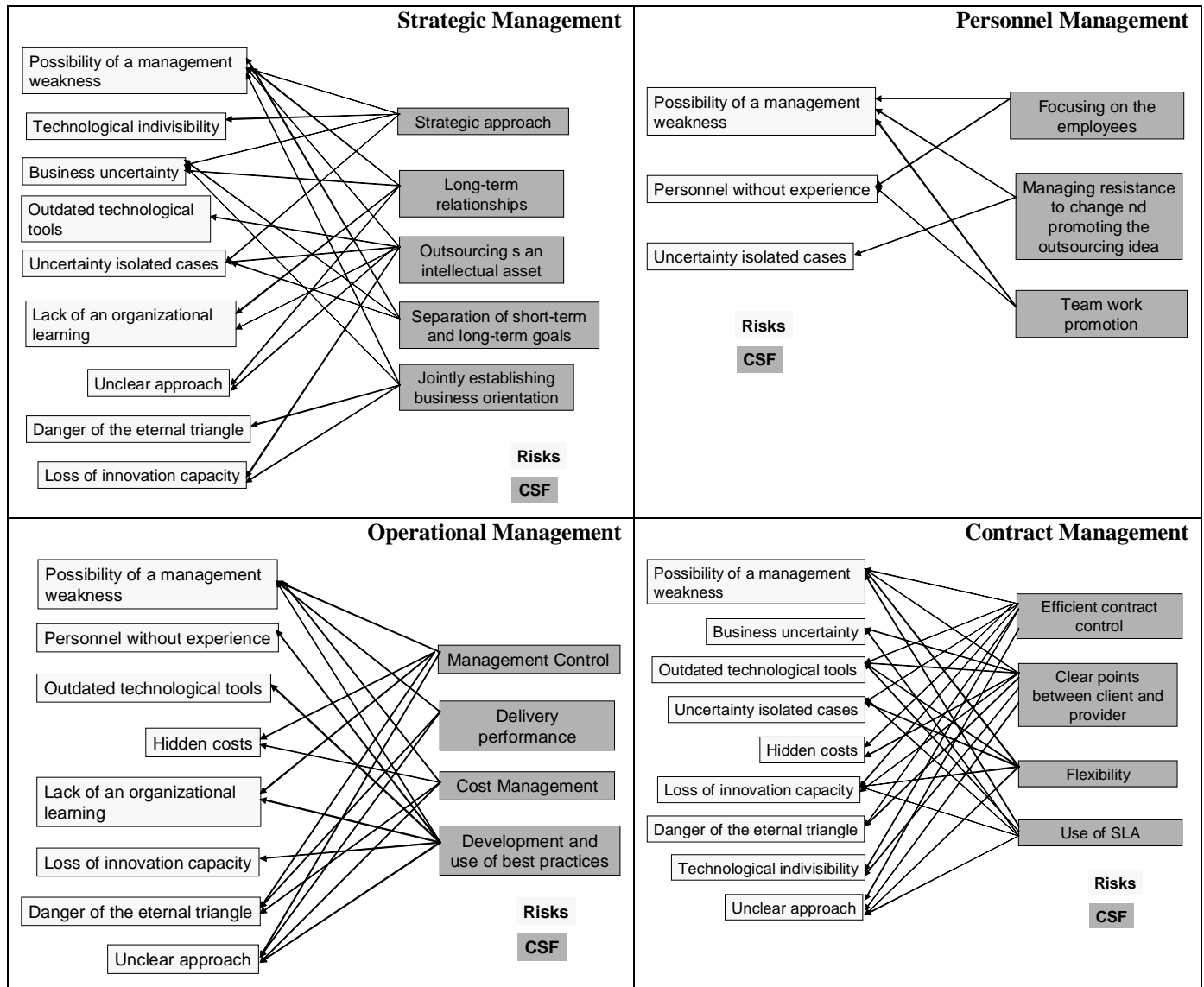
Figure 2. Management Category CSFs that serve to mitigate the risks associated to the ITO

Characterization of these relationships has not been proved and goes beyond the scope of this work. Once this idea was presented, it was convenient to select the evaluation method for the model of CSF proposed.

Once the selection criteria offered by DESMET Methodology (Kitchenham, 1996) were applied, the best method to evaluate the model based on CSFs for the IT Outsourcing was the *Analysis of Characteristics – Case Study*. The evaluation procedure is explained below.
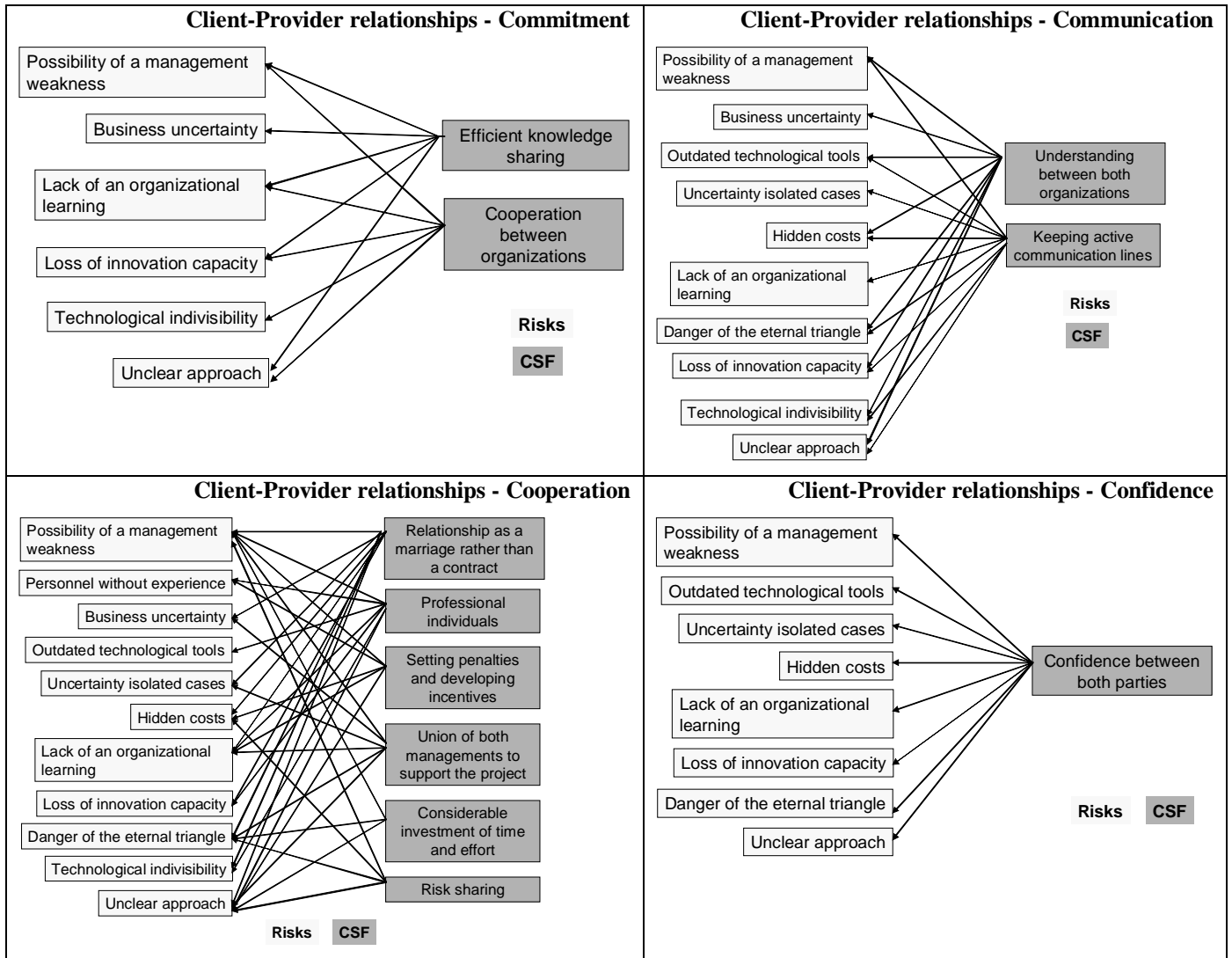
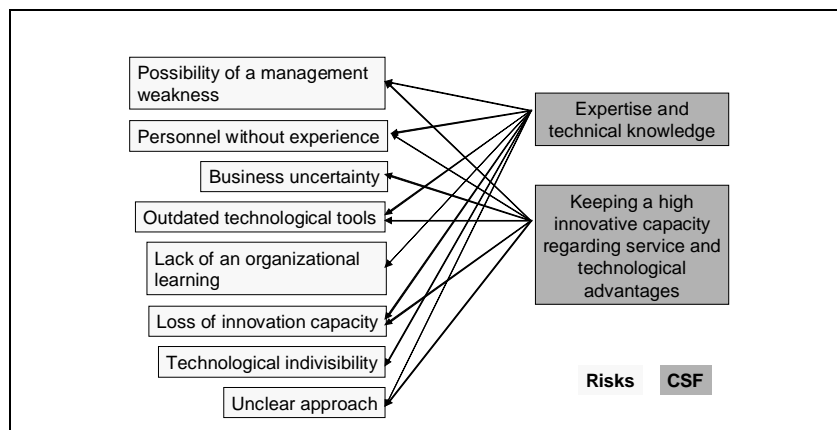**Figure 3. Client-Provider relationships Category CSFs that serve to mitigate the risks associated to the ITO**

Figure 4. Technical/Technological Category CSFs that serve to mitigate the risks associated to the ITO

ASSESSMENT OF THE CSF MODEL FOR IT OUTSOURCING – CASE STUDY

Two questionnaires were used in the Analysis of Characteristics – Case Study to assess the current status of the ITO Project in the organizations. These questionnaires presented two environments that were used to assess the reality of the project from two different points of view: the service provider and the client.

The Provider company provides a HelpDesk service to the Client company. This project was selected because once the model based on CSFs was applied, the experience of the Client company could be used since this provides ITO services in the areas of system development and contact centers to multiple organizations.

Then a third questionnaire was used to assess the CSF model presented to these companies at the moment of measuring characteristics such as Pertinence and Completeness of each CSF and characteristics like Pertinence, Range, Feasibility, and Depth Level of each Metric.

The steps proposed for the Analysis of Characteristics – Case Study and how were they applied to the CSF-based model are explained below.

1. A panel of evaluators was set up, consisting of four (4) persons who belonged to the management team of the IT Outsourcing Project of the case study and are widely experienced in IT Outsourcing in Venezuela.
2. Each characteristic was assessed both for CSFs and for Metrics.
3. Each characteristic for CSFs and Metrics was defined as **<u>Acceptable</u>** when 75% of the answers were positive (value 1), so that coherence and consistency could be guaranteed in relation to the acceptability levels established by the model (Mendoza et al., 2002).
4. Based on the previous criterion, **<u>Acceptance Criteria</u>** were obtained for each one of the defined characteristics, both for CSFs and for each Metric.
5. A CSF is considered **<u>Acceptable</u>**, according to the two (2) characteristics defined (Pertinence and Completeness of the factors involved), if the following conditions are met:
    -   A CSF must be Pertinent to guarantee that it is in fact a CSF. That is, the percentage of positive answers, in relation to the pertinence of a CSF, must be $\geq 75\%$.
    -   The average of the Acceptance Percentage of the two (2) characteristics must be equal or higher than the Acceptance Level defined (75%)
6. A Metric is considered **<u>Acceptable</u>**, according to the four (4) characteristics defined (Pertinence, Feasibility, Range and Depth Level), if the following conditions are met:
    -   It must be Pertinent and Feasible. That is, the percentage of positive answers, in relation to the pertinence and the feasibility of measuring the CSF, must be $\geq 75\%$.
    -   The average of the Acceptance Levels of the four (4) characteristics must be equal or higher than the Acceptance Level defined (75%)

The results obtained in the assessment of the CSF model proposed are shown in the following section.

RESULTS ANALYSIS

The results obtained for each characteristic as regards pertinence and completeness are shown in Figures 5, 6, and 7. The results for Pertinence of the Characteristics were 0.98/1, 1/1, and 1/1 in the categories of Management, Client-Provider Relationship, and Technical/Technological, respectively. In summary, all CSFs were classified as pertinent in the implementation of an IT Outsourcing Project; this means that the researchers were right in the selection of the CSFs that were used to build the proposed CSF model. For the Client-Provider of the ITO project, these are aspects that have to be considered before, during and after project implementation to enhance know-how for future services and improve the best practices, thus consolidating the contractual relationship by creating a competitive advantage. As to Completeness, the results were 0.8/1 for Management, 0.89/1 for Client-Provider Relationship; and 0.67/1 for Technical/Technological. The members of the panel of evaluators considered that the CSFs could be supplemented with additional metrics, as in CSFs # 2, 4, 8, 9,13, 14, 15, 18, 25, 28 and 29.

The assessment of the metrics of the CSF characteristics showed that the characteristics achieved a high acceptance percentage. The averages obtained with respect to the characteristics of Pertinence, Range, Feasibility, and Depth Level were as follows: 0.95/1 for Management, 0.99/1 for Client-Provider Relationship, and 1/1 for Technical/Technological. The range of metrics in the CSFs # 2, 3, 4, 6, 8, 12, 13, 14, 15, 16, 17, 21 should be improved, basically by changing the type of scale to allow for Feasibility in CSFs # 3, 4, 5, 6 and 7. Depth should be extended for metrics in CSFs # 1, 4, 6 and 20 by incorporating a higher degree of detail that provides value to the CSF.
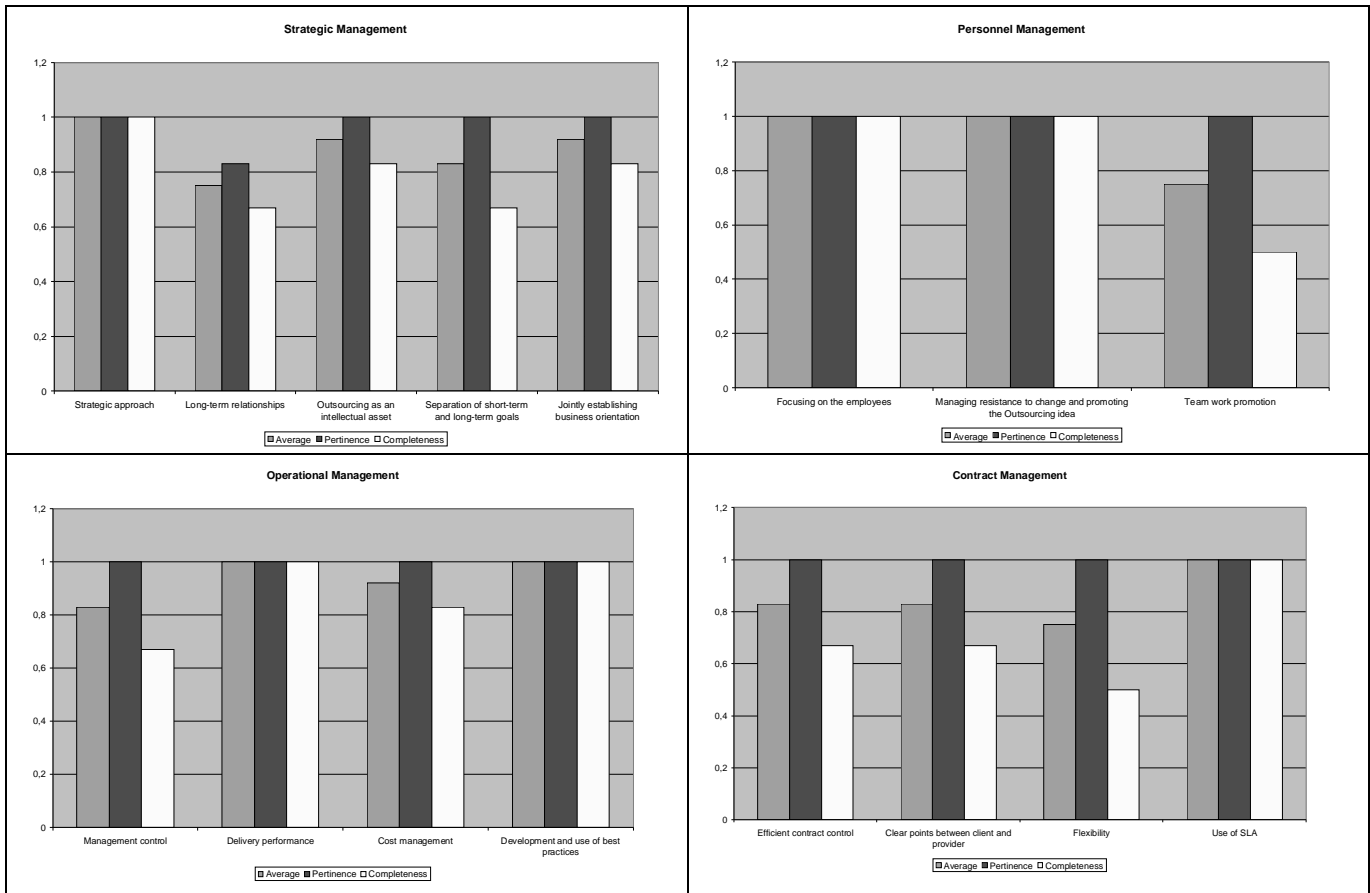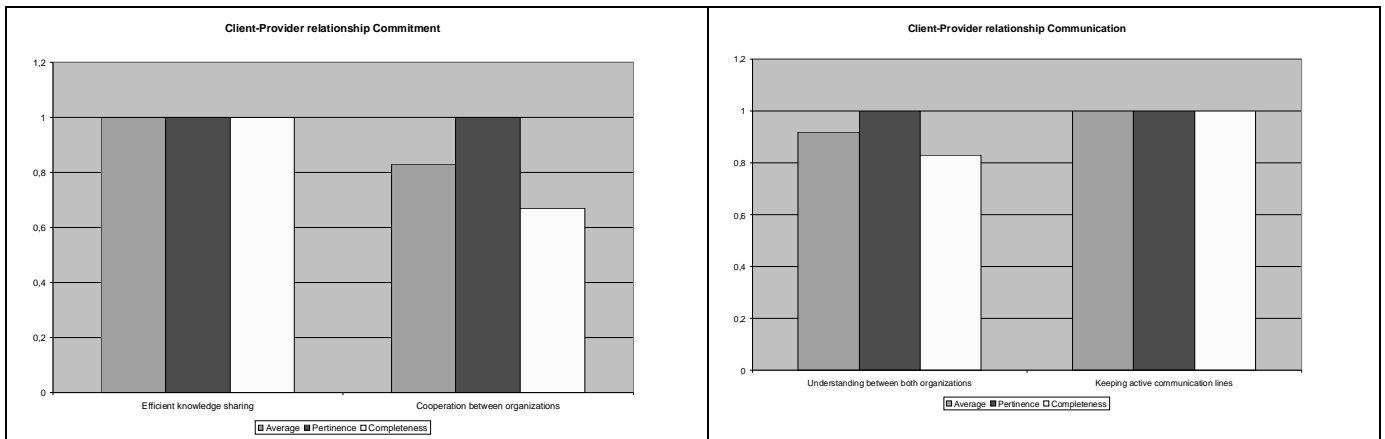
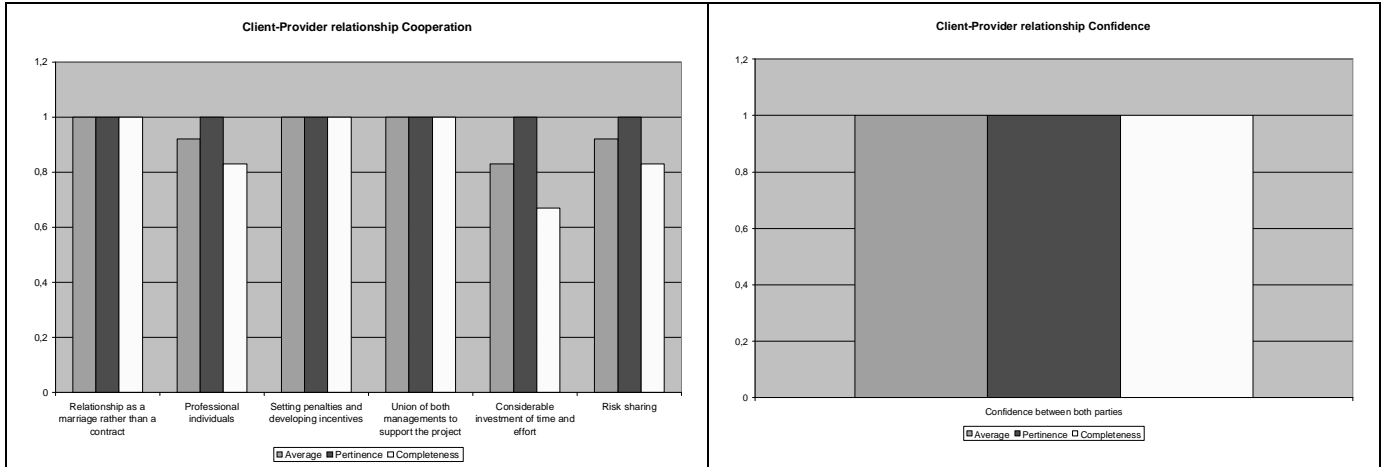**Figure 5. Results of the Management Category Evaluation**

Figure 6. Results of the Client-Provider relationships Category Evaluation
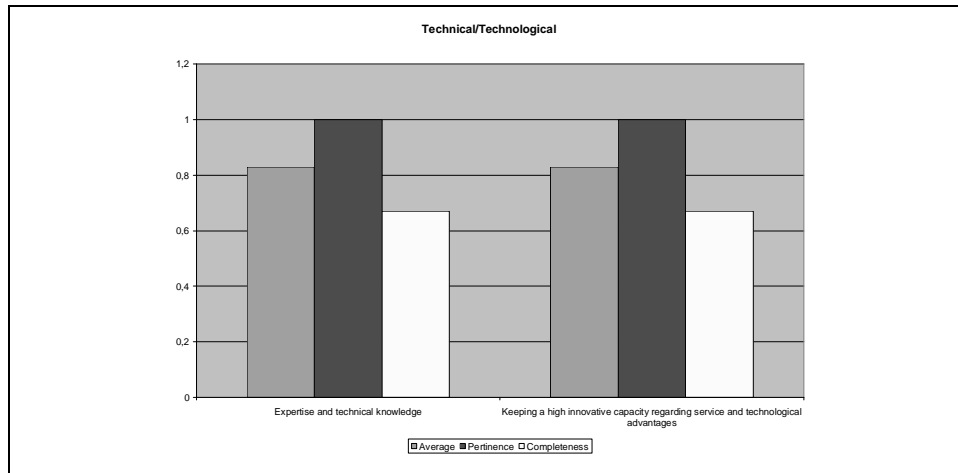

Figure 7. Results of the Technical/Technological Category Evaluation

CONCLUSION

A number of CSFs could be identified and gathered. These CSFs were used to propose, justify, and validate a CSF model for IT Outsourcing. This model is a guide for those companies implementing this kind of projects. In addition, according to the identification of the most common risks for ITO, a risk mitigation strategy could be developed by determining which CSFs are relevant for each risk. Characterization of these relationships was beyond the scope of this work, but it will be subject of study in future research. The model proposed is a beta version; other studies could present new CSFs, characteristics and/or metrics that may guide both client and provider companies to implement successful ITO projects. The first phase of this research has been completed. The second phase shall consist of testing, in different IT Outsourcing projects, the model presented in this paper, so that it can be adjusted; however, this was not considered for this phase. It is worth mentioning that related developments were set in motion, such as: a parametrizable tool that can be used for the CSFs automated processing with the aim of informing service providers, in a clear and timely fashion, about the status of their ITO project. A conceptual model could also be developed using UML (Unified Modeling Language), which broadly defines the characteristics and entities that intervene in an ITO project.

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