CRITICAL SUCCESS FACTORS TO EVALUATE INFORMATION TECHNOLOGY OUTSOURCING PROJECTS

Edumilis Méndez, María Pérez, Luis E. Mendoza and Maryoly Ortega
Processes and Systems Department – LISI, Universidad Simón Bolívar, Caracas, Venezuela

Keywords: Outsourcing, Information Technology, Critical Success Factor, Business Process.

Abstract: Nowadays, a large number of companies delegate their tasks to third parties in order to reduce costs, increase profitability, expand their horizon, and increase their competitive capacity. The level of success of such contracting and related agreements is influenced by a set of critical factors that may vary depending on the type of project addressed. This article proposes a model of Critical Success Factors (CSFs) to evaluate Information Technology Outsourcing (ITO) projects. The model is based on the ITO state-of-the-art, related technologies and different aspects that affect ITO project development. Altogether, 22 CSFs were formulated for data center, network, software development and hardware support technologies. Additionally, the model proposed was evaluated using the Features Analysis Case Study Method proposed by DESMET. The methodology applied for this research consisted of an adaptation of the Methodological Framework for Research of Information Systems, including the Goal Question Metric (GQM) approach. For model operationalization, 400 metrics were established, which allowed measuring CSFs and ensuring model effectiveness to evaluate the probability of success of an ITO project and provide guidance to the parties involved in such service.

1 INTRODUCTION

Information Technology Outsourcing (ITO) is an increasingly widespread practice among companies. Given that the scope and complexity of Information Technologies (IT) are constantly increasing, several companies are less prone to carry the burden of Information Systems (IS) internal development, and are considering Outsourcing to make a more efficient use of resources and lay the basis for increasing IT value (Lee et al., 2003). Hence, the importance of knowing which aspects may influence successful relations between the client company and the ITO project provider.

Accordingly, this article proposes a model consisting of 22 Critical Success Factors (CSFs) for evaluating ITO projects, focused on technology-related factors, including 400 metrics for model operationalization. This model provides guidance to support optimum performance for ITO practice and has an evaluation structure based on measurements of well-defined factors, which allows registering project data through the years. It allows not only specific evaluations, but also the follow-up and analysis of variations and trends.

2 RESEARCH METHODOLOGY

This research used the Methodological Framework for Research of Information Systems (Pérez et al., 2004). The adaptation of the Methodological Framework for this work consists of eleven steps: 1) Documentary and bibliographical research; 2) Background Analysis; 3) Formulation of the Objectives and Scope of the Research; 4) Adaptation of the Methodological Framework; 5) CSF Model proposal following GQM approach; 6) Analysis of Context; 7) Application of the DESMET Methodology (Kitchenham, 1996); 8) Model Evaluation; 9) Results Analysis; 10) Proposal Refining; and 11) Conclusions and Recommendations.

3 BACKGROUND

In order to achieve a successful ITO, certain practices known as CSFs should be included. Austin

Méndez E., Pérez M., E. Mendoza L. and Ortega M. (2008).
CRITICAL SUCCESS FACTORS TO EVALUATE INFORMATION TECHNOLOGY OUTSOURCING PROJECTS.
In *Proceedings of the Tenth International Conference on Enterprise Information Systems - ISAS*, pages 176-181
DOI: 10.5220/0001686801760181

(2002) defines CSFs as critical areas where satisfactory performance is required for the organization in order to achieve its goals. For the purposes of this article, a CSF is defined as any activity, task or requirement, where its correct performance contributes to meet the objectives of successful ITO projects. Such factors may be considered as critical to the extent their no compliance divert parties from meeting their expectations. Many activities might be considered as CSFs depending on the area and perspective involved. However, efforts invested in this research are aimed at identifying technology-related CSFs.

Several sources describe different types of CSFs that are overlapped or complemented depending on the approach used. Dhillon (2000) discusses the possibility of extracting critical activities from a business management perspective, while Lovells International Law Firm (2006) analyzes ITO from a legal perspective based on the large experience gained from their clients' activities.

The ITO Governance Model of Technology Business Integrators (TBI) discusses a business management approach (Bays, 2006), but contrary to Dhillon (2000), it provides a rather practical than theoretical analysis for this phenomenon. Also, Robinett et al. (2006) list a series of CSFs that point to a business-related approach, which is much more technical than managerial. This perspective is based on IBM's experience as IT leader and its integral business solutions policy.

However, the most recent ITO trend points to more restricted and specialized definitions for each contracted service. This implies a reduction in the spectrum of activities considered for each contract, including multilateral contracts with different providers, instead of traditional mega-contracts with a single provider. This new Strategic Out-Tasking model fostered by Cisco Systems Inc. (Brownell et al., 2006) promises a revolution in the ITO market with high profitability margins and superior service quality.

4 CSF MODEL PROPOSAL

The model proposed model is based on the concepts presented in Section 3. Table 1 shows a list of 22 CSFs resulting from the comparison of CSFs identified by different authors and specific models consulted, namely: (a) College of Business University of Nevada (Dhillon, 2000), (b) Lovells International Law Firm (2006), (c) Cisco Systems Inc. Strategic Out-Tasking Model (Brownell et al., 2006), (d) TBI ITO Governance Model (Bays, 2006) and (e) Center for Digital Government & IBM (Robinett et al., 2006). This comparison allowed the identification of differences and similarities among these approaches to consolidate the proposal on the four IT aspects aforementioned (O'Brien, 2005): data center, network, software development and hardware support.

A breakdown of CSFs is provided for each technology used. For data center and network technologies, the model lists several operations involved such as design, implementation, administration, maintenance, support, among others. For software development technologies, the model relies solely on development, while hardware technologies focus only on support.

Each CSF acts in different way depending on the technology involved. However, some factors may act in a similar manner regardless of the technology implied, namely CSF 11, 12, 20 and 21. Particularly, for CSF 11 "Establish multilateral agreements", if a client chooses to contract several providers and not to depend on just one, a structured process should be performed to select a group of organizations with expertise in the technologies and methodologies required by the contract, and whose interests do not conflict with those of the client. A provider with outstanding expertise must be selected for each service, giving priority to those providers who effectively served the same client in the past.

CSF 15 "Establish exclusivity agreements for key areas" is not considered for network technology, since the client would hardly commit the provider to grant it a certain degree of exclusivity.

The defined CSFs are a strong indicator of the possibilities of success of an ITO project. However, to ensure efficient use of these CSFs for project monitoring and related decision-making processes, all answers need to be converted into measurable information. Therefore, operationalization of this model was made using the GQM approach (Basili, 1992).

In this regard, metrics associated to each question defined on the CSFs allowed a detailed evaluation. Answers provided by experts to each question and their impact on each CSF were converted into a numeric scale in order to determine the overall performance of a certain type of project. Registering this information over the years might help establishing a benchmark for the median of ITO project performance within the market. Thus, each project performance might be compared against the

Table 1: Technological Critical Success Factor for ITO.

CSF	Reference models	CSF	Reference models
1. Define services from a modular perspective	a - b - c - e	12. Consider corporate regulations	b
2. Agree on the transfer of initial resources	b	13. Consider governmental regulations	a - c
3. Agree on the ownership of new resources	b	14. Consider personnel resources planning	b - e
4. Define a service evaluation structure	a - b - c - d - e	15. Establish exclusivity agreements for key areas	b
5. Define a predictable cost structure	b - c	16. Manage risks and assign responsibilities	b - d
6. Coordinate and standardize tasks integration	c - e	17. Consider potential service changes	a - b - d - e
7. Invest in technology innovations and planning	c - d - e	18. Define contract termination strategies	b
8. Maintain ownership and internal capabilities	c - e	19. Accelerate services life cycles	c
9. Consider licenses restrictions	b	20. Take into account cultural compatibility	a - e
10. Invest in value-added ecosystems (integration of services offered from different providers)	c	21. Dig deep into client-provider relations	c
11. Establish multilateral agreements with the right providers	a - b	22. Learn from the experience of allies organizations	d
(a) College of Business University of Nevada (Dhillon, 2000), (b) Lovells International Law Firm (2006), (c) Cisco Systems Inc. Strategic Out-Tasking Model (Brownell et al., 2006), (d) TBI ITO Governance Model (Bays, 2006) and (e) Center for Digital Government & IBM (Robinett et al., 2006).			

median established for the same type of project, providing an overview of the project good/bad performance to the extent it is below or above the respective average values.

Table 2: Application of the GQM approach to CSF 1 “Define services from a modular perspective”.

Goal	Modularize the SOW definition of the SW development service tasks from the perspective of the SW development project leader.	
Question	Q1	Does SOW include specification of the customer’s needs?
Metrics	M1	0: Not specified (0%) 1: Vague (25%) 2: Slightly specified (50%) 3: Well-specified (75%) 4: Detailed (100%)
Question	Q2	Does SOW define the use of development standards?
Metrics	M2	0: No 1: Yes

Table 2 shows an example of the application of the GQM model to CSF 1 “Define services from a modular perspective” for software development technology. Questions, metrics and corresponding measuring scales are defined therein.

In short, the ITO project model based on technology CSFs consists of 22 CSFs, including 400 questions and 400 metrics. Once proposed, the model was evaluated.

5 MODEL EVALUATION

The model proposed was evaluated using the method of Feature Analysis Case Study, which consists of evaluation of a model once it is applied to a real software project (Kitchenham and Jones, 1997). Such method comprises two large processes, namely Feature Analysis and Analysis Application to a Case Study.

In this regard, it was required to establish a group of features to measure questions associated to each CSF and metrics assigned to each question. Then, evaluators must decide whether metrics comply with such features, as shown in Table 3, divided into General and Specific Features; the former evaluate the model at a macro level, and the latter evaluate the model metrics. Additionally, the level of feature acceptance was established at 75%. This percentage was determined through consensus of the evaluators and researchers, by also considering it as a common practice for most quality models.

As for actors involved in the evaluation process, their roles and responsibilities are detailed in Kitchenham and Jones (1997): the sponsor is Research Laboratory in Information Systems (LISI by its abbreviations in Spanish); the article's authors were the evaluators; the model users were the organization's users who took part in the IT project evaluation; and the model evaluators were the organizations' analysts/developers, leaders and users, who answered the questionnaires.

For the purpose of analyzing the features (See Table 3) an IT project was required. Therefore, a software development project called SUAF (Unique Anti-fraud System) was selected, which provides a software solution for prevention and reduction of bank frauds, capable of monitoring bank transactions in real time and detecting irregular consumption patterns. The client company is a medium-size manufacturer, and the provider is a small-size company. Users in the client company involved in the SUAF project development evaluated the project. These users answered the CSF questions corresponding to the role they were assigned for project development. This showed how each of the model's CSFs was applied to the project selected, and translated into the project percentage of success.

Simultaneously, a set of questionnaires were prepared to evaluate the ITO model based on Technology CSFs against General and Specific Features presented in Table 4. This in order to prove the pertinence, completeness, adequacy and precision of CSFs, as well as the pertinence, feasibility, in-depth level and scale of the metrics. These questionnaires were addressed to the aforementioned model evaluators, who were also the users in charge of evaluating the project.

Given that the project selected was included in the ITO type defined as Outsourcing of Software Development, only CSFs identified for this classification were applied. Consequently, the analysis of General and Specific Features is based on the acceptance of these CSFs.

Table 3: General and Specific Features (Sosa, 2005).

Type	Name	Description	Scale
General	Pertinence of question	The question is pertinent or not in the context of CSF	1: The question is pertinent. 0: The question isn't pertinent.
	Completeness of CSFs	The questions give full coverage to all CSFs.	1: CSF is complete in terms of the questions used. 0: According to the context there are new questions that should be considered and incorporated.
	Adequacy with the context	The quality specification of the question is adequate in the context of the assessment	1: The question is adequate to the context of the assessment. 0: The question isn't adequate to the context of the assessment.
	Precision of quality specified by the question	The quality specified in the question is precise.	1: The quality level specified is precise. 0: The quality level specified isn't precise.
Specific	Pertinence of metric	The metric is pertinent for measuring whether or not there is the question to which it belongs	1: The metric is pertinent. 0: The metric isn't pertinent.
	Feasibility of metric	it is feasible to measure the question on the proposed metric in the context of the assessment	1: The metric is feasible. 0: The metric isn't feasible.
	In-depth level of metric	The metric has the level of depth adequate to get an relevant outcome	1: The metric has the level of depth adequate. 0: The metric requires a higher level of depth.
	Scale of metric	The proposed scale is adequate for measuring metric	1: The scale is adequate. 0: The scale isn't adequate.

Figure 1 shows the result of the analysis for the General Features of the CSFs included in the model proposed. A 100% completeness was observed for all CSFs included in the model. Likewise, through detailed observation, we noted an average pertinence of 98% and 97% adequacy. The model's most deficient performance lies in precision, with an average level of 90%, though a high level of acceptance is maintained. Nevertheless, we can observe a drop in certain metrics' precision, as in CSFs 17 (consider potential service changes) and 18 (Define contract termination strategies) with 67% and 75% of acceptance, respectively.

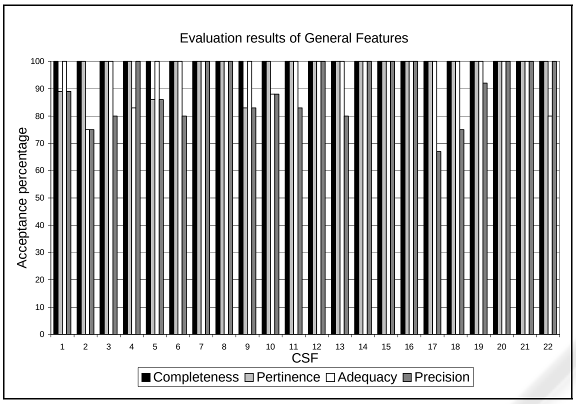

Figure 1: Evaluation Results of General Features.

Lastly, Figure 2 shows the evaluation of the model Specific Features. In this respect, pertinence of features shows a slight decrease when compared to General Features with 97%; whereas feasibility reached 99%. Depth accounts for the lowest levels with an average 91%, which also remains acceptable. However, what came to our attention were the relatively low level of depth of CSF 12 (Consider corporate regulations) and 16 (Manage risks and assign responsibilities), which reached 67%, thus not complying with the minimum acceptance levels; therefore, such metric's depth should be improved. Adequacy of Specific Features is lower than that obtained for General Features with an average 92%, though all CSFs exceeded minimum acceptance levels.

Based on the indicated above, some CSFs should be improved, to a lower extent, as to pertinence (CSF 1, 5, 8 and 11) and feasibility (CSF 9, 18 and 19); and to a higher extent, as to depth (CSF 1, 2, 3, 4, 5, 10, 12, 16 and 22) and suitability (CSF 1, 3, 5, 6, 8, 10, 13, 18, 22). The CSFs that need more improvements were CSF 1, 5, 10, 18 and 22, which showed weak behavior for two or more features.

These results, both for General and Specific Features, show a higher level of acceptance of the model proposed. The fact that all measurements are above 67% and more than 80% are over 75% of acceptance supports the model in general terms.

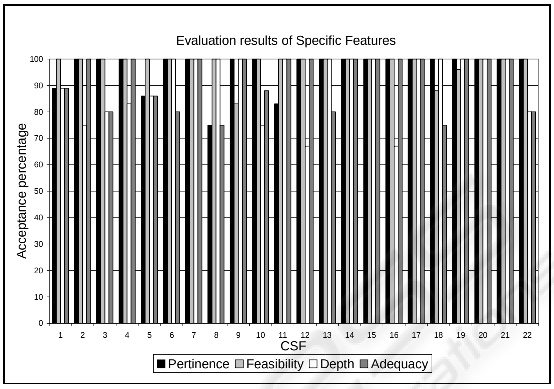

Figure 2: Evaluation Results of Specific Features.

6 DISCUSSION OF RESULTS

Although the proposed model complies with expected acceptance levels, after evaluating General and Specific Features, it should be relevant to improve, as ruled by future experiences, some of the metrics proposed, so experts may more precision rely on answering those questions that best represent the reality. Likewise, we recommend making some adjustments to the formulation of certain questions so to better adequate them to the context in which they are used and increase their general adequacy level.

Though the proposed model only comprises CSFs identified in the application of four relevant types of ITOs, several CSFs may be applied to other types of ITOs, and others may be included within the model; the most relevant areas being BPO (Business Process Outsourcing) and Help Desk due to the large volume of existing documentation and case studies found in the market. Other future potential benefits may include studies on lineal dependence/interdependence among the identified CSFs, or between one CSF and global performance of a certain project. Such dependencies might be sorted by type of project in order to determine which CSFs are of higher/lower relevance in accordance with the type of projects, and to suggest model modifications. Likewise, specifying the CSFs already identified into more granular components should be considered, including such detailed aspects as differences involved in the application of a certain product to cover the need for specific technologies.

7 CONCLUSIONS AND FUTURE WORKS

This article has proposed a Critical Success Factors (CSF) Model for Information Technology Outsourcing (ITO), which consists of 22 CSFs classified in accordance with the technology aspect encompassed by the ITO: data center, network, software development and hardware support. In addition, this model establishes a total of 400 metrics to measure CSFs.

The proposed model was evaluated using the Features Analysis Case Study Method for application of the model to a real case. The results of this evaluation show a high level of acceptance for the model proposed, specifically for the software development area, as well as effectiveness of its metrics, thus facilitating monitoring of the percentage of success of an ITO Project. Besides, the model provides guidelines addressed to the parties involved in this service. It is necessary to evaluate in future works the proposed model for the data center, network and hardware support areas, as well as to improve the CSFs for the General and Specific Features above mentioned.

ACKNOWLEDGEMENTS

The authors wish to thank Engs. Nuñez and Fernández for their valuable collaboration in the culmination of this research.

REFERENCES

Austin, D., 2002. Understanding Critical Success Factor Analysis. W. W. Grainger, Inc. W3C/WSAWG Spring. Retrieved February, 2007, from: www.w3.org/2002/ ws/arch/2/04/UCSFA.ppt.

Basili, V., 1992. Software modeling and measurement: the goal/question/metric paradigm. Technical Report CS-TR-2956. University of Maryland.

Bays, M., 2006. Best Governance Practices: Avoid Surprises with a Thorough Governance Program. HRO Today.

Brownell, B., Jegen, D. and Krishnamurthy, K., 2006. Strategic Out-Tasking: A New Model for Outsourcing. Cisco Systems, Inc., Internet Business Solutions Group [IBSG]. Retrieved February, 2007, from http://www.cisco.com/ web/about/ac79/docs/wp/Out-Tasking_WP_FINAL_0309.pdf.

Casale, F., 2005. The Outsourcing Revolution. The Outsourcing Institute. Retrieved November, 2006, from: http://www.outsourcing.com/content.asp?page=02v/articles/intelligence/OI_Index.pdf.

Dhillon, G., 2000. Outsourcing of IT service provision. Issues, concerns and some case examples. Las Vegas, EUA: University of Nevada, College of Business.

Fairchild, A., 2004. Information Technology Outsourcing (ITO) Governance: An Examination of the Outsourcing Management Maturity Model. Hawaii, EUA: Tilburg University. Retrieved September, 2006 from: http://csdl2.computer.org/comp/proceedings/hicss/2004/2056/08/205680232c.pdf

Lacity, M. and Willcocks, L., 2000. Survey of IT Outsourcing Experiences in US and UK Organization (Industry Trend or Event). In Journal of Global Information Management, 2(8), 5-23. Retrieved September, 2006, from: http://www.accessmylibrary.com/coms2/summary_0286-28399756_ITM.

Lee, J., Huynh, M., Chi-Wai, R. and Pi, S., 2003. The Evolution of Outsourcing Research: What is the Next Issue. In 33rd Hawaii International Conference on System Sciences.

Lovells International Law Firm, 2006. IT Outsourcing. Media Center Articles. Retrieved February, 2007, from: http://www.lovells.com/Lovells/Publications/Brochures/2443.htm?Download=True.

Robinett, C., Benton, S., Leight, M., Gamble, M. and Drakeley, C., 2006. A Strategic Guide for Local Government on: Outsourcing. U.S.A: Center for Digital Government & IBM. Retrieved February, 2007, from http://www-935.ibm.com/services/au/igs/pdf/au-ois-wp-strategic-guide-for-local-government-on-outsourcing.pdf.

O'Brien, J. A., 2005. Introduction to Information Systems. Nueva York, NY: McGraw-Hill.

Pérez, M., Grimán, A., Mendoza, L. and Rojas T., 2004. A Systemic Methodological Framework for IS Research, In Proceedings of AMCIS-10, New York, New Cork.

Robinett, C., Benton, S., Leight, M., Gamble, M. and Drakeley, C., 2006. A Strategic Guide for Local Government on: Outsourcing. U.S.A: Center for Digital Government & IBM. Retrieved February, 2007 from http://www-935.ibm.com/services/au/igs/pdf/au-ois-wp-strategic-guide-for-local-government-on-outsourcing.pdf

Sheehy, D., Baker, G., Chan, D., Cheung, A., Grunberg, H., Henrickson, R., 2003. Information Technology Outsourcing. Toronto, Canada: The Canadian Institute of Chartered Accountants. Retrieved September, 2006, from: http://www.cica.ca/multimedia/Download_Library/Research_Guidance/IT_Advisory_Committee/English/eITOutsou rcing0204.pdf

Sosa, J., 2005. Human Perspective on Systemic Quality of Information Systems. Working Masters in Systems Engineering, LISI. Venezuela, Caracas: Simón Bolívar University.