Research on Capability Assessment of IS Outsourcing Service Providers

Xinjun Li and Junyan Wang

School of Economic and Management, Yantai University, Yantai 264005, China
lixinjun101@163.com

Abstract

IS outsourcing services have developed into a major and continuously growing IS services business. Although there is a wealth of academic literature examining information systems (IS) outsourcing, there is little academic literature that addresses the current outsourcing problem that most firms facing, which is how to assess IS outsourcing service providers' capability. Given multiattribute nature of IS outsourcing service providers' capability assessment, this paper argues that thirteen capability criteria should be considered for assessments, and proposes the PROMETHEE as aids in assessing IS outsourcing service providers' capability decisions, together with changing weights for a sensitivity analysis. It shows by means of an application that the presented method is very well suited as a tool for the IS outsourcing service providers' capability assessment.

Keywords: *IS outsourcing, Project Management, Outsourcing and IS Development, Evaluation*

1. Introduction

The continuous need to improve efficiency and effectiveness in organizations is one of the main driving forces for the development of IS outsourcing services (Wang and Yang 2007). Although outsourcing services was hit by the financial crisis, IS outsourcing services as a whole have developed into a major and continuously growing IS services business(Whitten, Chakrabarty and Wakefield 2010). The management of IS outsourcing is always to challenge organizations, both IS outsourcing service providers and their clients need to understand what makes IS outsourcing successful (Ang and Straub 2004). Prior research has identified that IS outsourcing service providers' capability is one of the key factors, which impact the success of IS outsourcing (Han, Lee and Seo 2008). Although there is a wealth of academic literature examining information systems outsourcing(Gonzalez and Llopis 2006; King and Torkzadeh 2008), there is little academic literature that addressed how to assess IS outsourcing service providers' capability and presents a clear gap in previous research.

In this paper, we focus on the how to assess outsourcing service providers' capability. It will apply the PROMETHEE to the "how to assess outsourcing service providers' capability" question in an effort to demonstrate one quantitative method to this complex assessment.

2. Performance Criteria

When evaluating IS outsourcing service providers' capability, a number of criteria could be considered. There have been a lot of attempts to find out all factors of IS outsourcing service providers' capability assessment, but the problem has not been theoretically solved. The choice of factors has been selected in agreement with a group of experts and managers. Another group might have selected a somewhat different set of factors. Firms should select all factors which can affect organizations benefit as possible as they can. A careful examination of factors used before is provided in Table 1 (Feeny,

Lacity and Willcocks 2005; ITSqc 2010; Liou and Chuang 2010; Levina and Ross 2003; Reza, Thiam, Sai, and Zeinab, 2014; Ye Fang and Zhang 2009).

3. The Adopted Method

The PROMETHEE approach. The PROMETHEE method is applicable to the following multi-criteria problem:

$$\max\{f_1(x), f_2(x), \cdots, f_n(x) \mid x \in X\} \tag{1}$$

where X is a finite set of possible alternatives, and f_j are n criteria to be maximized. For each alternative, $f_j(x)$ is an evaluation of this alternative. When we compare two alternatives $x_i, x_k \in X (i \neq k)$ we must acquire the solvers of these comparisons based on preference. We, therefore, resolve a preference function P.

Let

$$P(x_i, x_k) = F(d) = F[f(x_i) - f(x_k)], \tag{2}$$

$$0 \leq P(x_i, x_k) \leq 1 \tag{3}$$

Table 1. Capability Criteria

Criteria	Explanation
Business understanding (C1)	Meeting both client service-level agreements and its own business plan, discussions about service returns.
Knowledge management (C2)	Demonstrating a commitment to knowledge sharing through formal policies, effectively managing the use of process assets across the organization, taking advantage of expert practices.
Human resources (C3)	Establishing and maintaining an effective work environment, building competences, managing employee satisfaction, motivation, and retention.
Performance management (C4)	Establishing organization-wide programs to meet its objective, measuring the organization's capabilities and benchmarking its performance as the basis for improvements
Relationship management (C5)	Establishing and maintaining trust and ensuring the effectiveness of interactions with clients and partner relationships, managing the cultural differences between stakeholder, and managing the client's and end-users' satisfaction.
Technology management (C6)	Managing the acquisition and deployment of technology, integrating the organization's technology infrastructure, optimizing the performance of the technology infrastructure.
Security management (C7)	Risk management through formal policies, managing intellectual property threats, identifying, assessing, and controlling risk, preparing for and managing recovery from disasters

Service delivery (C8)	Tracking service delivery activities, delivering services according to agree-upon commitments, identifying problems that impact service delivery and taking both preventive and corrective actions
Marketing exploitation (C9)	Building well-known brand, brand's competition
Planning & contracting (C10)	Planning and tracking organization's activities, developing a clearly service specification, obtaining and using feedback, managing service design and deployment
Language (C11)	Speaking, writing, understanding, communicating
Service transfer (C12)	Managing the effective transfer of resources, ensuring continuity of service during the service transfer
Enhancing value (C13)	Continuously innovate to add statistically and practically significant value to the services they provide to their client's and other stakeholders

Be the preference function associated to the criteria, where $F(d)$ is a monotonically increasing function of the observed deviation (d) between $f(x_i)$ and $f(x_k)$. In order to facilitate the selection of specific preference function, six basic types of this preference function are proposed to decision maker, in each case no more than two parameters (thresholds q, p or s) have to be fixed (Lo and Chen 2012).

PROMETHEE permits the computation of the following quantities for alternatives x_i and x_k:

$$\begin{cases} \pi(x_i, x_k) = \dfrac{\sum_{j=1}^{n} w_j P_j(x_i, x_k)}{\sum_{j=1}^{n} w_j}, \\ \phi^+(x_i) = \displaystyle\sum_{x_k \in X} \pi(x_i, x_k), \\ \phi^-(x_i) = \displaystyle\sum_{x_k \in X} \pi(x_k, x_i), \\ \phi(x_i) = \phi^+(x_i) - \phi^-(x_i). \end{cases} \qquad (4)$$

Where w_j are weights associated with criteria. All the alternatives can be completely ranked (PROMETHEEII) by net flow (Figueira, Greco and Ehrgott 2005) .

The geometrical analysis for interactive aid (GAIA) plane displays graphically the relative position of the alternatives in terms of contributions to the various criteria (Brans and Vincke 1985).

In the next section a real, but simplified, IS outsourcing service providers' capability assessment problem is presented to illustrate our approach in practice.

4. An Application

4.1the Problem Faced

A Chinese manufacturer want to outsource its information systems functions to outside expert, five candidates (Vendor 1, Vendor 2, Vendor 3, Vendor 4, and Vendor 5) can

meet its need. They think about the factors of vendor's capabilities and want to know how to decide which service provider should be selected.

4.2 Criteria Weights

The personal construct theory (PCT) was used for the weight definition, as shown in Figure 1(for detailed presentations please see (Goletsis, Psarras and Samouilidis)).

4.3 The Problem Faced–Evaluation and Analysis

The evaluations of these 5 alternatives according to the previously stated criteria, i.e. evaluation matrix, are displayed in Table 2. Each semantic value included in the set {very weak, weak, common, good, very good} is associated with a numerical value, such as ranking from 1 to 5, which is used for the calculations.

Before using the PROMETHEE method to assess the candidate IS outsourcing service providers, for each criterion, a specific Preference Function (PF), with its thresholds is defined (see Table 3).

The problem was completely prepared for implementation of PROMETHEE II, performing the comparison with the weights gotten by the PCT method leads to the final values of leaving, entering and net flows and the complete ranking of alternatives in Table 4 and in Figure 2.

The priority for the five IS outsourcing service providers are in the following order: Vendor4, Vendor1, Vendor 2, Vendor5, and Vendor 3.

The assessment problem can be represented in the GAIA plane (see Figure. 3, where candidate vendors are represented by points and criteria by vectors).

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	RtC	Final RtC	Weight
C1	-		e		e		e			e		e		7	8	0.125
C2		-	X	e	X	e	X		X					5	6	0.094
C3			-		e		e		e					7	8	0.125
C4				-	X	e	X	e	X	e				3	4	0.063
C5					-		e		e	e				7	8	0.125
C6						-	e	e	X	e	e			2	3	0.047
C7							-		e	e				6	7	0.109
C8								-	X	e				3	4	0.063
C9									-	e				7	8	0.125
C10										-				3	4	0.063
C11											-	e		1	2	0.031
C12												-	e	0	1	0.015
C13													-	0	1	0.015
													Total	64		

Note: Final RtC= RtC + 1 so as c11 to be taken into account
An X indicates that the column construct "resists to change", A blank indicates that the row construct "resists to change", An e indicates that the two constructs change simultaneously

Figure 1. Criteria Weights Definition with the Use Personal Construct Theory

Table 2. Evaluation Matrix

Criteria	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13
Min/max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max
Vendor1	4	2	3	5	4	2	5	4	4	4	3	3	2
Vendor2	2	5	4	2	1	4	1	3	5	2	4	2	3
Vendor3	2	2	1	4	3	3	3	2	2	3	1	4	1
Vendor4	5	2	5	3	4	4	4	5	4	5	2	5	4
Vendor5	2	1	4	2	5	2	2	1	4	2	3	2	1

Table 3. Preference Functions

Criteria	PF	Thresholds			Criteria	PF	Thresholds		
		q	p	s			q	p	s
C1	Linear	1	2	-	C8	Level	1	2	-
C2	Level	1	2	-	C9	Level	1	2	-
C3	Level	1	2	-	C10	Level	1	2	-
C4	U-shape	2	-	-	C11	Level	1	2	-
C5	Level	1	2	-	C12	Level	1	2	-
C6	U-shape	2	-	-	C13	U-shape	2	-	-
C7	Linear	1	2	-					

Table 4. PROMETHEE Flows

Alternative	Φ^+	Φ^-	Φ
Vendor1	0.31	0.04	0.27
Vendor2	0.18	0.31	-0.13
Vendor3	0.05	0.37	-0.32
Vendor4	0.34	0.03	0.31
Vendor5	0.10	0.23	-0.13
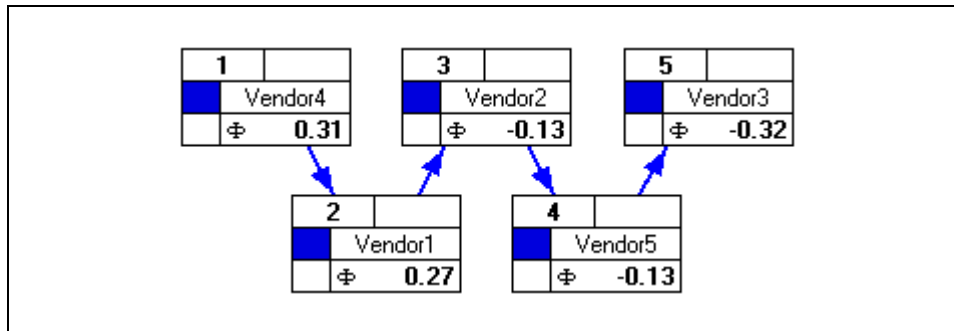
Figure 2. PROMETHEEII Complete Ranking

4.4 The Problem Faced-Sensitivity Analysis

When the weights of the criteria are modified, we have to analyze the impact on the results by a sensitivity analysis. Table 5 gives for each criterion the limits within weights' values which can vary without changing the PROMETHEE II complete ranking. From the result of sensitivity analysis, it is clear that C7, C5, C4 and C11 have the greatest impact on the complete ranking.
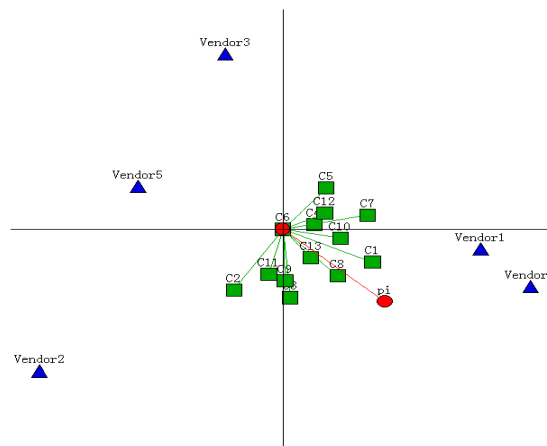
Figure 3. Gaia Analysis

Table 5. Stability Intervals

Criteria	Weight	Interval		Criteria	Weight	Interval	
		Min	Max			Min	Max
C1	0.125	0.0000	1.0000	C8	0.063	0.0622	0.4670
C2	0.094	0.0936	0.3146	C9	0.125	0.1215	0.7926
C3	0.125	0.0249	0.6646	C10	0.063	0.0000	0.4670
C4	0.063	0.0000	0.1300	C11	0.031	0.0291	0.1603
C5	0.125	0.0000	0.1253	C12	0.015	0.0000	0.2442
C6	0.047	0.0000	1.0000	C13	0.015	0.0130	1.0000
C7	0.109	0.0000	0.1108				

5. Conclusions

This research described herein presents a proposal for applying a decision model to support the IS outsourcing service providers' capability assessment, this model uses one multiple criteria decision aid techniques (PROMETHEE), with more dimensions and a sensitivity analysis approach. We have tried to explain how the PROMETHEE method provides powerful tools to assess IS outsourcing service providers' capability and to analyze the relations between criteria. The proposed assessment model can help practitioners choose and analyze factors and attributes easily. Because it is a quantitative process, the practitioners can make better decisions and obtain better results from IS outsourcing service providers' capability assessment.

Acknowledgements

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Authors
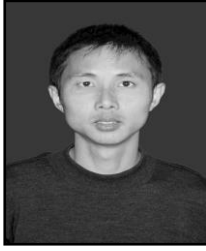
Xinjun Li, he is an associate professor in the school of economics and management at Yantai University, China. He received MS in management science and engineering from Tianjin University (2004) and PhD in operations management from Southeast University (2007). He is a postdoctoral fellow twice at Shanghai Jiaotong University and Dalian University of Technology respectively. His current research interests mainly focus on supply chain management and information management. His research is published in leading scientific journals such as "Asia-Pacific Journal of Operational Research", "Operations Research and Management Science", "Journal of Industrial Engineering and Engineering Management", "Control and Decision" and "Journal of Mechanical Engineering".

Junyan Wang, she is a master from the school of economics and management at Yantai University. She received her bachelor's degree in Shandong University of Finance and Economics in 2014. His research direction is business management and supply chain management.