A STUDY OF INFORMATION SYSTEMS OUTSOURCING INFLUENTIAL FACTORS

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Abstract:

Information Systems Outsourcing is a constantly growing practice in all sorts of organisations. This paper analyses the level of Information Systems outsourcing at Spanish public universities. It also means to determine if factors such as the size, both of universities and of their Information Systems departments, as well as the degree of involvement of Rector's and General Manager's Teams in matters related to Information Technologies can have an influence on the outsourcing level. With this aim, a survey has been made among the Information Systems managers in all the universities under examination.

Keywords:

Information Systems Outsourcing, Public Spanish Universities.

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Introduction

A growing tendency exists on the part of organisations to examine the different activities of their value chain, in order to externalise those activities that do not form part of their competitive advantage (Ching, Holsapple and Whinston, 1996). Currently, one of the activities which organisations most often choose to externalise is that related to Information Management and, in fact, outsourcing is one of the information services that has grown the most in recent years (Caldwell, 1996; Lacity and Willcocks, 1998; McLellan, Marcolin and Beamish, 1995; Palvia, 1995). What is more, whereas, in the past, outsourcing was restricted to non-information-intensive factors, in which Information Systems (IS) did not play an essential role in the enterprise's competitiveness, nowadays it is possible to find this type of contract in sectors with a high information content (McLellan, Marcolin and Beamish, 1995).

Taking into account the widespread growth of IS outsourcing, the present paper focuses on the introduction of these services in Spanish public universities, with the intention of determining the degree in which outsourcing is used and whether this use depends on the following factors:

- The size of the university and its IS department (Computers, Data Processing Centre or any other similar name).
- The involvement of the top management in ISs.

As regards the first factor, the argument that production costs are higher in IS departments than for an outside provider could lead us to the conclusion that universities with smaller IS departments will have a stronger tendency to use outsourcing than those having larger IS departments, since the latter will obtain scale economies through the provision of such services. Likewise, we could think that smaller universities have fewer internal resources and prefer to turn their fixed costs into variable ones, that is to say, they would rather keep a minimum IS infrastructure and externalise most of their activities. However, some results suggest that neither the size of the organisation nor that of its IS departments are indicative of a more or less marked tendency to externalisation, or of the success

or failure to adopt this decision (Grover, Cheon and Teng, 1994: 42; Lacity and Willcocks, 1998: 382-382).

In relation to the second factor, we intend to know the degree of involvement on the part of university's top management (Rector and Vice-Rectors, General Manager and Vice-General Managers) in ISs, considering three aspects: in first place, how they think Information Technologies (ITs) contribute to the fulfilment of the university's general objectives; in second place, what their direct relation with ITs is like, in other words, whether or not they use them daily in their work; and finally, seeing what their level of participation is in IS-related decision-making. As we have just said, we want to check whether these factors have an influence on IS outsourcing.

The top management's view as regards ITs and their role in IS-linked decision-making, have been repeatedly analysed as factors determining for the good or bad results obtained by organisations' ISs (Brabander and Thiers, 1984; Dos Santos, 1989; Feeny, Edwards and Simpson, 1992; Jarvenpaa and Ives, 1991; Rockart, Earl and Ross, 1996; Ross, Beath and Goodhue, 1996; Schein, 1994; Yap, Soh and Raman, 1992). This is why it becomes important to identify the position adopted by the university top management in front of outsourcing decisions.

Previous studies have reached the conclusion that when top managers collaborated with IS managers in outsourcing decisions, better results were obtained than when both collectives acted separately (Lacity and Willcocks, 1998: 371). It has also been seen that enterprises, whose top managers do not normally use ITs, and in which IS managers have a very distant relationship with the top management, are usually the ones that externalise the most, perhaps because the top management see ISs as a necessary evil, but also as something they do not completely understand, which is why they try to solve these matters in the most economical way and making the least possible efforts, i.e., externalising (Arnett and Jones, 1994: 187).

Once we have explained the objective of our study we are now going to describe the methodology we have used in this research work, as well as of the results obtained.

Methodology

In order to deal with the empirical work, we have carried out a survey in the universities under analysis. There is a disadvantage we have to face; namely, the fact that there are hardly any field studies on IS outsourcing in general, since the habitual works about these matters refer to the experiences of specific firms; in other words, they are case studies.

Taking the literature about this topic as our reference, we elaborated the first draft of the questionnaire. We discussed this draft with the head of the University of Alicante's Data Processing Centre [1], who suggested various modifications that helped to enrich the questionnaire. After making the appropriate modifications, a parcel was sent to all 47 Spanish public universities, which contained the final questionnaire, and a presentation letter for the study, in which its objectives were explained; recipients were asked to fill in the questionnaire and guarantees were given that their answers would be anonymous. The parcel also included a stamped addressed envelope, so that the filled-in questionnaire could be returned. The questionnaire recipients were the heads of ISs at the different universities, whose names and addresses were collected after a laborious search through the webpages of each university.

Although we addressed the 47 individuals that form the universe of the survey, we only obtained 35 valid cases. This means we worked with a global error level of ± 1.2 . These 35 cases account for 74.5% of the universities.

Results

The data obtained in the survey have been treated using the SPSS 9.0 software for Windows.

Profile of Universities and Interviewees

take in Table I

Organizations interviewed represent the diversity of Spanish university institutions in terms of their age: from those that are over one century old, which account for 17.1%, to the most modern ones created in the 90's (see Table I); the latter are the most numerous, since they account for 31.4% of the answers obtained, a piece of information that confirms the expansion the Spanish university system has experienced in recent years.

As regards size, most of them (42.9%) have between 25,000 and 50,000 registered students, while the percentage corresponding to those with less than 25,000 students is lower (37.1%), and only very few have more than 50,000 students (17.1%). Additional data that can be revealing about dimensions have to do with staff. The figures for teaching and research staff in an average university amount to 1,659 people, with a further 701 people dedicated to administration and service tasks. The IS service is included in the second group and counts on 31 workers on average at each university.

The figures above tell us that we find ourselves in front of very complex organisations, considering the number of workers and clients (students) they have.

take in Table II

As for the IS manager (Table II), to whom the survey is addressed, he has had that job for 5 years on average, and his age ranges between 29 and 57 years old, the average being 41. Most of these responsibility posts are occupied by males, and in terms of the university organisation chart, they are under the authority of the General Manager, of one Vice-Rector, or both.

Outsourced Activities

take in Table III

The specific activities of IS services are represented on Table III, which shows the percentage of externalisation of those activities at the universities being

analysed. As can be seen, hardware maintenance, followed by programming, software maintenance, applications analysis and staff and/or user training are the most often externalised activities. However, services such as systems implementation, network services, support to end users, security and system operations are not usually contracted with an external provider.

Anyhow, except for hardware maintenance, universities do not externalise a large proportion of their IS activities. Instead, they opt for a kind of outsourcing that can be called selective. Furthermore, the tasks that are most often contracted with external providers are easily justified; on the one hand, it is customary for hardware and software maintenance to be carried out by providers as an additional updating service. On the other hand, when working peaks arise in these activities, as a result of the development of new systems, it is also common to contract externally the most monotonous part of the development, like, for example, programming. Hence, we can say that Spanish universities do not stand out as organisations externalising a large proportion of their IS activities.

Involvement of the University Top Management in IS Departments

The interviewees answered a set of questions in which they gave their opinion about the behaviour of the university top management regarding ISs in their university, using the three above-mentioned questions:

- How do they see the role of ISs in the fulfilment of university objectives?
- What is their involvement in IT use?
- What is their role in IS-related decision-making?

take in Table IV

take in Table V

The university top management thinks that ISs play an important role in the fulfilment of university objectives; both Rector's and General Manager's Teams agree on that (Table IV). So much so, that nobody questions that ISs are neutral in the achievement of such objectives. As regards the use of ITs (Table V), a large proportion use them directly (as is the case in 45.7% of Rector's teams and in 40%

of General Manager's teams), though a high percentage exists that do not use ISs directly, but who insist on their importance, as well as on the fact that university staff must use them (22.9% of Rector's teams and 28.6% of General Manager's teams).

take in Table VI

Concerning the involvement in IS-related decisions, Table IV shows that a high intervention level exists in these matters, both on the part of Rector's teams and by General Manager's teams. The majority of the answers are either that they are considered the top decision-makers in IT issues (that is the case of 34.3% of Rector's teams and 17.1% of the General Manager's teams), or that although they are not the top decision-makers, they also actively participate in these matters (in 28.6% of Rector's teams and 51.5% of General Manager's teams). There are fewer cases in which the top management does not intervene a lot in IS-related decisions, but they appoint someone to stand for them in these issues (20% of Rector's teams and 14.3% of General Manager's teams) and nobody states that the top management does not participate at all in this decision-making process.

The analysis of Tables IV, V and VI shows that consensus is quite widespread in the actions of Rector's and General Manager's teams. Only in the last table do we find a slight difference regarding the behaviour of both collectives. In order to check whether or not that difference is statistically significant, we have carried out a *T test* for paired samples. This procedure compares the averages of two variables of a single group, calculates the differences between the values of the two variables in each case and checks if the average is different from 0. In our case, the aim is knowing whether the behaviour of Rector's teams differs from that of General Manager's teams, at each university. The results of this test appear on Tables VII and VIII, both of which confirm that the behaviour of these two collectives is similar, and that not even their level of intervention in IS decisions (par 3, VIb-VIIb) is different, since *T*'s level of significance is (in all cases) above 0.05.

take in Table VII

take in Table VIII

The results obtained for this heading must be analysed taking into account two limitations: firstly, what we present is IS managers' opinion about the top management vision with respect to the new ITs. Therefore, we refer to the opinion of a third party. Furthermore, the no-answer index is quite high, perhaps because these matters were considered very delicate, as they refer to the behaviour of a superior; this is also the case in other research works in which similar topics are dealt with, like that by Arnett and Jones (1994, 183-184).

The incidence of Size on the Outsourcing Level

take in Table IX

We use Table IX, which shows the correlations (Kendall's Tau-b) between variables measuring size (Ib, Ic, Id y Ie) and externalisation percentages (variables VIIIa to VIIIj) [2], in order to determine whether the size of universities, measured by the number of students, lecturers and researchers as well as the administration and service staff, on the one hand, and the size of the IS department, measured by staff working for this department, on the other, have an impact on the outsourcing level. It is checked that the significant correlations are negative, which is an indication that the larger the size of the university, the less outsourcing is used; this fact is justified if we consider that the largest universities count on a sufficient internal infrastructure that makes it unnecessary for them to choose outside providers.

However, the size of the IS department is only negatively correlated with systems installation and security; this is why we could say that this size, measured by the number of IS staff, does not have a decisive influence on the level of outsourcing.

The University Top Management and the Level of Outsourcing

take in Table X

Finally, we have tried to determine whether the university top management's involvement in ISs can determine the outsourcing level. With this aim, we elaborated Table X, with a structure similar to that of Table IX, which shows significant correlations between variables related to the involvement of Rector's and General Manager's teams in ISs (variables IIIa, IIIb, IVb, Vb, VIb and VIIb) and variables referring to IS externalised activities (variables VIIIa to VIIIj). Also, like in the previous case, significant correlations between both groups of variables are negative. Since high scores (4 or 5) for variables IIIa, IIIb, IVb, Vb, VIb and VIIb imply a lower level of involvement of Rector's and General Manager's teams in ISs, the previous result shows that as the top management's opinion about ISs progressively improves, and as an increase is seen in their IS use level, as well as in their degree of involvement concerning decisions related to these services, IS outsourcing is consequently adopted to a greater extent. This result is completely opposed to that of previous works, like that by Arnett and Jones (1994) and goes clearly against the expectations. Above all, we should note that the most often externalised activity (hardware maintenance, code VIIId) depends on the Rector's team's decisions (VIb); in other words, that activity tends to be more often externalised in universities in which the Rector and Vice-Rector have more decision-making capacity on IS matters. Moreover, programming (VIIIb), which is the second most often externalised activity, depends on the Rector's team's view about ISs (IIIa), as well as on the extent to which both Rector's and General Manager's teams use ISs (IVb and Vb). Therefore, programming activities are more often externalised in those universities in which the top management uses ISs more directly and where the Rector's team thinks that ISs make a large contribution to managerial objectives.

Conclusions

IS outsourcing is an alternative to the internal management of ITs that is useful for public universities, since it can contribute to IS cost control. However, the level of externalisation at Spanish public universities is not very high; the

activities that are most often contracted with external providers are hardware and software maintenance along with programming, which can be considered non-specific activities.

The results analysed confirm that universities under analysis are very complex, considering the number of workers and students these organisations count on.

We can refer to a considerable level of involvement on the part of the university top management in matters related to ISs, since they believe that the role of these systems is basic for the operation of universities; they use ITs directly in their work or, at least, they insist on the fact that university staff should use them and have a significant influence on IS-related decisions made at their respective universities.

The data obtained in this study suggest that the larger the size of the university, the less outsourcing is used, supposedly because there is a sufficient internal infrastructure that makes it unnecessary for them to choose this alternative. However, the size of the IS department itself has no relation whatsoever with the outsourcing level.

The top management's involvement is also related to the outsourcing level; contrary to what was expected, the greater the degree of involvement, the more IS activities are externalised.

We must point out some limitations in this study, since certain results are based on the opinions that IS managers have about Rector's and General Manager's teams at their universities. Therefore, we are explaining the actions of a third party that can be biased, since IS managers could try to give a good image of their superiors. Other limitations, mentioned in the presentation of results too, allow us to offer only signs of behaviours justifying the more or less marked tendency to use IS outsourcing in the organisations being analysed, but prevent us from taking these facts as irrefutable. Anyhow, we hope to have paved the way for a new line of research that can be further developed in later studies.

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Notes

[1] This is Mr. Manuel Aparicio, to whom we are very thankful for his collaboration.

[2] Table IX, exactly like Table X, only shows correlations that are significant at a 0.01 or 0.05 level; non-significant correlations do not appear, in order to make result interpretation easier.

TABLE I: UNIVERSITY PROFILE

(Code Ia) Date of Creation		(Code Ib) Registered Students		
More than a century ago	6 (17.1%)	0-25,000	13	(37.1%)
1960/1979	8 (22.9%)	25-50,000	15	(42.9%)
1980/1989	3 (8.6%)	More than 50,000	6	(17.1%)
After 1990	11 (31.4%)	No answer	1	(2.9%)
No answer	7 (20.0%)	TOTAL	35	(100.0%)
TOTAL	35 (100.0%)			
	Minimum	Maximum	Mean	Std. Deviation
(Code Ic) NLR^a (n=33)	542	3500	1659.4 8	883.50
(Code Id) NASS^b (n=33)	200	1500	701.03	379.94
(Code Ie) NISS^c (n=34)	9	83	31.06	18.35

^a Number of Lecturers and Researchers.

^b Number of Administrative and Service Staff.

^c Number of IS Staff.

TABLE II: THE IS MANAGER AT THE UNIVERSITY

	Minimum	Maximum	Mean	Std. Deviation
Length of service (years) (n=34)	0.5	13.5	5.0	3.9
Age (n=33)	29	57	41.8	7.4
Sex (n=31)	Male	Female	No answer	
	30 (85.7%)	1 (2.8%)	4	(11.5%)
Direct Superior (n=35)	General Manager	Vice-Rector	Both	
	10 (28.6%)	15 (42.8%)	10	(28.6%)

TABLE III: OUTSOURCED IS ACTIVITIES (PERCENTAGES)

Code	Externalisation Percentages	
	Mean	Std. Deviation
VIIIId Hardware Maintenance	70.1	33.7
VIIIb Programming	38.1	34.8
VIIIe Software Maintenance	37.6	28.6
VIIIa Applications Analysis	28.0	32.9
VIIIi Staff and/or User Training	26.6	28.1
VIIIf Systems Implementation	19.3	21.8
VIIIg Network Service	15.0	20.7
VIIIh Support to End Users	4.3	7.7

VIIIj	Security	4.3	17.5
VIIIc	Systems Operation	3.7	10.3

TABLE IV: IS CONTRIBUTION TO THE FULFILMENT OF UNIVERSITY OBJECTIVES

		Current Rector's Team Code IIIa	Current General Manager's Team Code IIIb
No answer	0	2 (5.7%)	2 (5.7%)
Very Important	1	18 (51.4%)	23 (65.7%)
Important	2	15 (42.9%)	8 (22.9%)
Somewhat	3	0 (0.0%)	2 (5.7%)
Important			
Neutral	4	0 (0.0%)	0 (0.0%)

TABLE V: USE OF ITS

		Current Rector's Team Code IVb	Current General Manager's Team Code Vb
No answer	0	5 (14.3%)	5 (14.3%)
They often use these technologies directly	1	16 (45.7%)	14 (40.0%)
They use these technologies symbolically	2	4 (11.4%)	4 (11.4%)
They insist on the importance of these technologies (teaching and administration staff should use them), but do not use them directly	3	8 (22.9%)	10 (28.6%)
In general, they promote the use of these technologies	4	2 (5.7%)	2 (5.7%)
They do not normally use them and do not care about their use either	5	0 (0.0%)	0 (0.0%)

TABLE VI: INTERVENTION IN IS-RELATED DECISIONS

		Current Rector's Team Code VIb	Current General Manager's Team Code VIIb
No answer	0	6 (17.1%)	6 (17.1%)
They are the main decision-makers in these matters	1	12 (34.3%)	6 (17.1%)
Although they are not the main decision-makers, they have an active participation	2	10 (28.6%)	18 (51.5%)
They do not get very involved, but designate somebody to represent them	3	7 (20.0%)	5 (14.3%)
They are quite inactive and do not usually participate	4	0 (0.0%)	0 (0.0%)

TABLE VII: T TEST: STATISTICS OF PAIRED SAMPLES

	M ean	N	Std. Deviation	Std. Error Mean	Correlati on	Sig.
Par 1: IIIa IIIb	1.37 1.29	35 35	0.60 0.67	0.10 0.11	0.758	0.000
Par 2: IVb Vb	1.60 1.71	35 35	1.17 1.20	0.20 0.20	0.838	0.000
Par 3: VIb VIIb	1.51 1.63	35 35	1.01 0.94	0.17 0.16	0.762	0.000

TABLE VIII: T-TEST: PAIRED SAMPLES TEST

	Paired Differences					T	df.	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	Confidence Interval of the Difference				
				Lower	Upper			
Pair 1: IIIa-IIIb	8.57E-02	0.450.68	7.53E-02	-6.73E-02	0.240.12	1.139-1.00	3434	0.2630.324
Pair 2: IVb-Vb	-0.11	0.68	0.11	-0.35	0.12	0	34	0.324
Pair 3: VIb-VIIb	-0.11		0.11	-0.35		-1.000		

TABLE IX: OUTSOURCING AND UNIVERSITY SIZE^a

C ode		Ib	Ic	Id	Ie
VIII a	Correl. Coeff. Significance	-0.350* 0.016	-0.280* 0.033	-0.325* 0.013	
VIII b	Correl. Coeff. Significance	-0.359* 0.013			
VIII c	Correl. Coeff. Significance				
VIII d	Correl. Coeff. Significance				

VIII e	Correl. Coeff. Significanc e				
VIII f	Correl Coeff. Significanc e		-0.328* 0.013	-0.339** 0.010	-0.350** 0.007
VIII g	Correl. Coeff. Sigificance				
VIII h	Correl. Coeff Significanc e	-0.453** 0.005	-0.297* 0.041		
VIIIi	Correl. Coeff. Significanc e	-0.346* 0.019			
VIIIj	Correl. Coeff. Significanc e	-0.394* 0.015	-0.399** 0.006	-0.406** 0.005	-0.308* 0.033

^aSignificant Correlations (Kendall's Tau-b).

*The correlation is significant at the 0.05 level (2-tailed).

**The correlation is significant at the 0.01 level (2-tailed).

TABLE X: OUTSOURCING AND THE TOP UNIVERSITY MANAGEMENT^a

C ode		IIIa	IIIb	IVb	Vb	VIb	VIIb
VIII a	Correl. Coeff. Significanc e						
VIII b	Correl. Coeff. Significanc e	-0.335* 0.022		-0.316* 0.022	-0.379** 0.006		
VIII c	Correl. Coeff. Significanc e	-0.413* 0.011	-0.325* 0.043	-0.482** 0.002	-0.490** 0.001	-0.330* 0.031	-0.319* 0.040
VIII d	Correl. Coeff. Significanc e					-0.474** 0.001	
VIII e	Correl. Coeff. Significanc e						
VIII f	Correl. Coeff. Significanc e						
VIII g	Correl Coeff.						

	Significance						
VIII h	Correl. Coeff. Significance					0.377* 0.014	
VIIIi	Correl. Coeff. Significance	-0.364* 0.015	-0.406** 0.006				
VIIIj	Correl. Coeff. Significance						

^aSignificant Correlations (Kendall's Tau-b).

*The correlation is significant at the 0.05 level (2-tailed).

**The correlation is significant at the 0.01 level (2-tailed).