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SOCIAL NETWORKS AND CONTRACT ENFORCEMENT IN IT OUTSOURCING

Abstract

Most prior research on Information Technology Outsourcing(ITO) has characterized the dominant governance modes as either 'Formal' or 'Relational,' which rely on stringent assumptions of perfect foresight or about the extent to which one party can punish unilateral deviations by the other. We propose a third alternative in addition to dyadic measures of inter-firm reputation. The reputation of an actor may be associated with how the firm is positioned in a network, which in turn influences how information about a particular actor flows within the network. Such aspects of structural embeddedness suggest a role in predicting characteristics of inter-firm exchange. The network capital offers a measure to mitigate the uncertainty associated the nature of service outsourced and the service provider. The network of trading partners enables a community enforcement of contracting terms by providing safeguards that may not be offered by traditional measures of formal or relational governance.

Based on a large dataset of publicly announced ITO arrangements, we examine the role that structural embeddedness can play in predicting contract duration. Our preliminary results are very encouraging. We find evidence suggesting that network position does matter in predicting contract structure over and above the traditional economic variables.

Keywords: Social Network, Reputation, IT Outsourcing, Contract governance

1 INTRODUCTION

Firms have always aimed to exploit economies of scale and scope (Chandler, 1990). However, recent advances in information technology (IT) have enabled firms to harness these capabilities from beyond the rigid boundaries of the firm (Gurbaxani and Whang, 1991; Malone et al., 1987). Boeing Defense Operations introduced two prototypes of its 'Joint Strike Fighter' using only fifty-eight employees in its Palmdale, California facility -- the rest of the organization comprised of hundreds of geographically dispersed suppliers (Quinn, 2000). Case studies of virtualized organizations like Boeing, as well as Dell and Intel underline the dominance of IT Outsourcing as the preferred mode of sourcing IT capability.

The market for IT outsourcing (ITO) is predicted to reach \$290 billion by 2010 (Gartner, 2006) and the average contract size of the top 100 outsourcing deals of 2005 is \$700 million (IDC, 2006). However, studies have shown that large numbers of contractual disputes and unraveled outsourcing relationships are not uncommon (DiamondCluster, 2006). Given the global acceptance of ITO as a critical business thrust, it becomes imperative for firms undertaking ITO to gauge the potential of non-cooperative behavior by the other party.

Despite rigorous vendor evaluation procedures, ex-ante verification of the vendors' ability can be difficult (Banerjee and Duflo, 2000; Kalnins and Mayer, 2004). Quality certifications like "CMM-levels"¹ have been shown to be either ineffective (Bannerjee and Duflo, 2000) or merely a costly signal (Gopal and Gao, 2008). Thus vendor selection based on the firm's organizational, financial or human capital alone need not predict a long term outsourcing relationship. An often cited reason for failed outsourcing relationships is the challenges posed by governance.

Several early papers that examined contracting in IT outsourcing advance the view that governance mechanisms ought to be as explicit, and contracts as complete as possible (Hirschheim and Lacity, 2000; Lacity and Hirschheim, 1993; Lacity and Willcocks, 1998). At the same time, several other researchers have argued that the costs of enforcement render it difficult to draft a truly complete contract, and posited that mechanisms such as reputation and repeated relationships offer a more effective governance structure (Banerjee and Duflo, 2000).

Both streams of prior literature make stringent assumptions on what can be contractible or what can be enforceable between parties. The stream of literature that argues for formal contracts as enforcement devices assumes that a third party is ex-post able to both observe and verify the contractual contingencies, that were specified ex-ante. On the other hand, relational contracting models, while relaxing the assumption of verifiability, assume that the parties involved interact repeatedly, that contracting parties have symmetric information about the realization of outcomes and that any potential deviations in cooperative behavior are detected and punished (Baker et al., 2002; Brown et al., 2004).

In the case of ITO both of these assumptions are strong assumptions to make. An ITO arrangement typically includes requirements that are difficult to verify and difficult to specify ex ante (Banerjee and Duflo, 2000; Kalnins and Mayer, 2004) (Banerjee and Duflo, 2000), (Kalnins and Mayer, 2004). This limits the extent to which formal contracts can protect parties from rent appropriation. IT outsourcing, even if undertaken with the same vendor, need not involve the repeated exchange of identical products or services, as usually assumed in relational contracting models (Baker et al., 2002). This makes IT outsourcing the ideal platform to test the role of alternate reputation mechanisms in enforcing contract terms.

In this paper we study the role of network capital in governance of IT outsourcing contracts. Inter-organizational networks arise in this market from the stock of past outsourcing transactions conducted

¹ Capability Maturity Models range from level 1 to level 5. Achieving level 5 is seen as recognition of a vendor's process capability and is not a measure of output quality.

across a broad spectrum of firms. The network can serve as a conduit for relational information about potential exchange partners. The reputation of a firm can be a result of how the firm is positioned in a network, which influences how much information about the particular firm flows within the network; thus, the “structural embeddedness” of a firm is important.

The aspect of structural embeddedness in relation to contract characteristics is different from the dyadic measures of reputation in economics literature or relational embeddedness in sociology. Such dyadic measures can be a source of relationship specificity that strengthens contracts (Brown et al., 2004) or a determinant of contract characteristics in a future transaction (Banerjee and Duflo, 2000). However, the relationship can also act as signals of underlying quality of the participants to other participants in the network beyond the dyad (Podolny, 2001).

Structural embeddedness also adds to the transaction cost economics argument of ‘fundamental transformation’ or ‘small numbers bargaining’ (Uzzi, 1997). If we were to buy the premise of relational contracting (that successful prior engagement introduces relationship specificity) the market for ITO would be limited to dyads of exchange partners locked into bilateral trading relationships. The reason for this being that when specific investments are important to an exchange, parties prefer to insulate themselves from competition *ex post*; preferring to continue in bilateral exchange because the value of trading together outweighs the advantages of trading with others. However, the existence of firms with multiple trading partners suggests that reputation and relational embeddedness does not completely explain the choice of partners. Looking at this from a structural embeddedness perspective, we can argue that structure provides a mechanism for preventing opportunism through communal enforcement (Kandori, 1992), which allows firms to benefit from the expansion of its network (Beckman et al., 2004; Uzzi, 1997)

In summary, we suggest that the networked nature of ITO industry provides an environment where the network could affect the nature of the contract. Specifically, the identity of the trading partner in the network characterized by proximity and centrality (Robinson and Stuart, 2006), play an additional role in governance as measured in the duration of the initial and the renewed contract.

2 THEORY AND HYPOTHESIS

2.1 The nature of uncertainty

IT Outsourcing poses a unique challenge in the extent to which both clients and firms experience uncertainty. Broadly the uncertainty can be classified as uncertainty pertaining to the nature of service and uncertainty pertaining to the nature of the service provider. This bifurcation is consistent with the ego-centric and alter-centric uncertainty arguments of Podolny (Podolny, 2001).

Literature identifies a few sources of service-related uncertainty as the *ex-ante* uncertainty in cost (Kalnins and Mayer, 2004), requirements, project size, resources (Gopal et al., 2003); and *ex-post* uncertainty in quality (Kalnins and Mayer, 2004) and outcomes (Eisenhardt, 1989). Given the rapidly changing nature of the industry and user expectations it is not surprising that longer-term projects often require changes in design and product architecture (Nidumolu, 1995). Literature on software project management has recognized that ‘software development is an information intensive activity, and decision points are continually reached where the decision maker possesses inadequate information’ (Zmud, 1979). Applications with induction-based algorithms such as those that support planning, forecasting, and management decision-making activities are more complex and than applications with rule-based algorithms that support operational and transaction-processing activities (Banker and Slaughter, 2000). Therefore it is difficult for end user organizations to completely specify *ex-ante* the requirements that need to be met by the vendor especially for business-support functions typically outsourced.

Theoretical literature on contracting posits that difficulty in describing task structure is a source of contractual incompleteness (Dye, 1985). The difficulty in describing complex IT contracts imposes limits on enumerating contractual provisions in detail. Potential contingencies are seldom defined

satisfactorily at the outset and further, negotiating mutually acceptable solutions in the event of a dispute is laborious. This limitation in specifying governance parameters completely is only worsened in the presence of service-related uncertainty (Segal, 1999).

The second source of uncertainty is in anticipating vendor ability (Bannerjee and Duflo, 2000). Given asymmetric information, vendors could behave opportunistically ex-post. Incomplete contracts can further increase the costly process of governing opportunistic vendors. It has been suggested that tighter contracts be employed (Goles and Hirschheim, 2000; Lacity and Hirschheim, 1993; Lacity and Willcocks, 1998). It has also been suggested that the solution lay in relying on repeated relationships as a more effective governance structure (Banerjee and Duflo, 2000). However, given that there are limits to legal protection by contracts, there is a necessity for other more proactive governance mechanisms.

2.2 The role of contract duration

The interaction of uncertainty with rapidly changing technology in the IT industry creates a need for constant renegotiation between the client and the firm. Further, outsourcing relationships need to provide incentives for specific investments by the vendors to ensure meeting the specific and complex demands of the ITO arrangement. We consider two key roles that contract duration plays in contract governance.

On one hand, renegotiation costs constitute a significant portion of the total cost of outsourcing (Williamson, 1985). Long term contracts can also induce better sharing of gains from trade (Brown et al., 2004; Joskow, 1987; Masten and Crocker, 1985). Consistently, ITO service providers prefer long-term contracts to ensure a longer stream of revenue just as clients appreciate the lower cost of repeated haggling.

On the other hand, clients may in fact chose to sign shorter term contracts if they could rule out service-related uncertainty. Client firms would benefit from not being locked in to a long term contract, they could offer higher-powered incentives through repeated spot contracts and ensure the highest effort levels from the service providers. Client firms would then successfully have avoided the small-numbers bargaining problem that often creates excessive switching costs when wishing to terminate a contract. Literature in software engineering warns us of the complexity that arises with contract duration. Longer projects often call for re-doing requirements analysis given the difficulty in foreseeing future requirements (Jenkins et al., 1984) and are liable to slippages in schedule, leading to more costs further along the project (Pressman). This suggests that given the choice, projects ought to be as short as possible if project related uncertainty can be reduced.

Therefore we assert that in the presence of service specific uncertainty contract durations are likely to be shorter while in the presence of service-provider specific uncertainty, the duration of contracts are likely to be longer.

3 RESEARCH FRAMEWORK

Summarizing the theoretical arguments we can conclude that the firms' ex-ante decision on the optimal contract duration is likely to be influenced by how well it can mitigate uncertainty related to the project and vendors' ability. This presents our overarching research question – How does network position affect the choice of contract duration?

To examine this question we propose a framework that considers possible strategies that firms could adopt in the context of overlapping uncertainties. Table 1 below, illustrates the interaction of service uncertainty with service-provider uncertainty and possible strategies.

	Service provider Uncertainty: LOW	Service provider Uncertainty: HIGH
Service uncertainty: LOW	Limited application of social capital in predicting vendor behavior.	Hypothesis 1: Mitigating service provider uncertainty allows longer contract duration
		Possible strategies to mitigate service provider uncertainty <ul style="list-style-type: none"> • Seek alternate measures of vendor reputation from many other vendors. • Seek the opinion of key client firms
Service uncertainty: HIGH	Hypothesis 2: Exposing service-related uncertainty can allow shorter contracts	Hypothesis 3: Contracting with vendors that are reputed among other vendors will likely be of longer duration
	Possible strategies to mitigate service-level uncertainty <ul style="list-style-type: none"> • Competitive bidding between vendors 	Possible strategies to mitigate both kinds of uncertainty. <ul style="list-style-type: none"> • Identify central vendors in the industry • Benchmark vendor abilities

Table 1. Data Summary

In the presence of low levels of uncertainty in both dimensions, intrinsic measures of organizational capital are likely to be associated with longer contract duration. This offers our base-line hypothesis.

In the situation where uncertainty about the nature of the service provider is high while uncertainty about the service itself is low we hypothesize that the focal client firm would aim to reduce service provider specific uncertainty. Reducing this uncertainty can allow client firms to sign longer contracts and. Focal client firms could rely on the reputational capital that the vendor has accumulated by association with a more client firms. In addition, the focal firms could rely on observing the status of the clients that the service provider firms associates with. (Hypothesis 1)

In the context of high service level uncertainty but fairly low levels of service provider uncertainty focal firms could easily exploit its position of leverage to pit one vendor against another to reveal service specific uncertainty. We hypothesise that doing so would allow the client firm to sign a contract of shorter duration and completely avail the benefits of the market. (Hypothesis 2)

From the perspective of the focal client firm, the significance of social capital as a measure of reputation takes most importance in the presence of uncertainty in both dimensions. Focal client firms would likely aim to reduce both vendor level uncertainty as well as service level uncertainty, or alternatively the client might do away with strategies to reduce uncertainty on its own and instead entrust outsourcing to vendors that have built up a position of ‘reputation’. It is conceivable that such capable vendors have occupied a position of high status not just among the entire network of clients and vendors but even among the population of vendors themselves. We hypothesize that when clients contract with vendors who hold high status amongst the set of vendors, clients would be amenable to signing longer term contracts.

The measure of status in a unipartite projection of a bipartite network needs special attention. In a unipartite projection of the vendor network, a tie between two vendors is formed when they share a common client. Therefore a central vendor in this network is one that belongs to a group of vendors that share the same clients. It is likely that centrality in this unipartite network therefore indicates belonging to a set of preferred vendors. From the perspective of a focal client, contracting with such preferred vendors should reassure them of non-opportunism for two reasons. It is likely that vendor firms have occupied this position of centrality owing to repeated non-opportunistic behaviour. Alternately it is likely being a part of a preferred set of vendors, the cost of opportunistic behaviour to the vendor is disproportionately greater than the benefits of deviation in any one contract due to the possibility of being removed from this set of preferred service providers.

4 THE DATA

Our dataset comprises of public announcements of outsourcing contracts awarded. For the purposes of our analysis, an outsourcing arrangement refers to a multiyear relationship in which one or more vendor firms are assigned the responsibility of providing an IT service to a client firm. This definition is consistent with both academic research as well as industry analysts (Grover et al., 1996; IDC, 2006; Lacity and Hirschheim, 1993). A typical public announcement is of the following form: “Firm A awarded Firm B a contract worth \$X for providing service S for a duration T.” However, not every announcement needs to have disclosed all the above elements. Often contract value, duration or the services included are not mentioned in the announcement.

4.1 The Outsourcing Organization Network

Our sample includes announcements that were published during the period 1985 to 2005. However, due to small sample sizes for the years prior to 1994, we restrict our sample to the period 1994-2004. The number of unique contracts in the entire time period is 2518. At minimum these announcements provide the client’s and vendor’s identity. From these we identify a sub-sample of non-government contracts that provide, in addition, the contract value and duration. This subsample comprises of 914 unique observations. This distinction is relevant as our research method relies on both social network variables as well as econometric variables. The former requires knowledge of the identity of the contractors while the latter require knowledge of the content of the contract.

To create the network of IT outsourcers we use the entire sample, which provides complete information of the actors involved in the transaction. The network measures are then computed from this entire network. However, for purposes of econometric analysis that require contract information we limit ourselves to the sub-sample that contains contract information. Government contracts were excluded in the econometric analysis as contract structure and the contracting process for government contracts are likely to be very different from non-government contracts.

The data comes from two sources. During the time period 1994-2000, one of the authors maintained a personal database of publicly announced ITO contracts. The second half of the data (period 1999-2004) comes from a professional industry analysis firm whose name we are obliged to keep confidential². As part of their routine research and analysis activity, this firm updates their database with announcements of ITO contracts that were released through various newswire services.

	Statistics	Whole sample				
		Contracts	duration	Revenue(\$million)	Employees (1000's)	EBITDA (\$million)
Vendors	mean	6.45	4.81	8773.17	33.70	1508.63
	sd	26.53	2.87	16701.22	66.29	3647.66
	min	1	1	0.29	0.009	-166.266
	p50	1	5	1408.502	9	134.2
	max	312	20	81667	443	29065
	N	374	216	180	161	180
Clients	mean	1.56	6.00	17177.82	49.41	3437.33
	sd	2.12	3.04	35707.15	84.32	10040.02
	min	1	0.4	1.789	0.038	-1808

² Contracts that had been captured in both datasets in the year 2000 have been included only once.

	p50	1	5	5374.759	21.59	905.06
	max	51	20	156911.9	905.77	118107.00
	N	1544	1056	379	355	377
Restricted sample						
Vendors	mean	7.59	5.56	12309.52	38.29	2064.92
	sd	29.63	2.94	18393.29	65.71	4311.18
	min	1	1	0.29	0.009	-166.266
	p50	1	5	3426.69	9.95	310.10
	max	278	20	81667.00	291.07	19804.00
	N	100	100	54	48	54
Clients	mean	1.52	6.90	15150.98	41.04	2180.65
	sd	1.49	3.05	26404.13	63.03	3585.01
	min	1	1	1.789	0.038	-1808
	p50	1	7	4122.47	19.14	932.75
	max	17	20	156911.90	484.00	25568.00
	N	563	563	183	174	184

Table 2 Data Summary

This dataset is then appended with firm characteristics obtained from Compustat, a company that provides public financial information on companies. Using Compustat we augment our dataset with information about the firms such as number of employees, revenue, and earnings during the year in which the contract was signed. Summary statistics are provided in Table 2.

Actors involved in the 2412 contracts are 1544 unique client firms and 374 unique vendors. The number of contracts per vendor range from 1 to 312. On average each vendor has 6.44 contracts over the 11 years. In terms of firm characteristics, client firms, on average, earn a revenue of \$18.8 billion, has an EBITDA of \$2.9 billion and employs 51,300 employees. The average service provider on the other hand, earns revenues of \$8.1 billion, an EBITDA of \$1.2 million with 29,900 employees³. When comparing summary statistics across the whole sample versus the restricted sample, we note no statistical difference in the summary statistics of the two networks.

4.2 Social Network structure

An edge in this network corresponds to an ITO contract between a client firm and a service provider firm. The two actors associated with each tie belong to two modes, namely clients and vendors. This two-mode structure allows us to examine the network as both bipartite, comprised of clients and service providers, as well as a unipartite projection of the bipartite graph comprised of either all clients or all service providers. The former lets us understand the nature of the industry structure as a whole while the latter allows us to understand the structure of firms among its own kind. In the unipartite projection an edge between two firms represents a connection between the two firms that either provide service to a common client or receive service from a common vendor.

4.2.1 Social Network Structure – Bipartite

This set of relationships is captured over the 11-year time period 1994-2004. There exists a significant spike in the number of contracts in the year 1999. This can be attributed to the sudden uptake in ITO

³ Clients financial attributes are statistically different from that of vendor financial attributes (revenue and ebitda are different at $p < 0.01$ while number of employees is different at $p < .07$)

given the fear of the “Y2K bug”. We see a corresponding drop in the network density measure. Therefore while the total volume of outsourcing was less before 1999, the network was denser than it was after 1999.

year	'94	'95	'96	'97	'98	'99	'00	'01	'02	'03	'04	Overall
Edges	44	71	69	60	52	525	220	322	231	289	202	2041
Density	0.01	0.008	0.008	0.008	0.010	0.001	0.003	0.002	0.002	0.003	0.003	0.0006

Table 3. Network Density over time

The complete network exhibits the typical core-periphery structure. The core corresponds to the large interconnected main component of the graph. Almost unconnected from the core are various smaller components comprising the periphery.

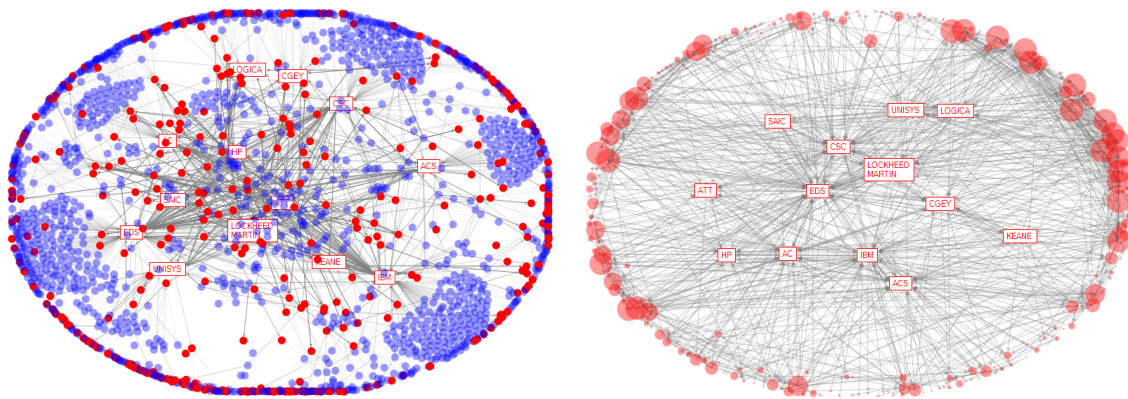


Figure 1. **Left:** Bipartite Graph of the entire network laid out using Frucheterman-Reingold algorithm; red: service providers, blue: clients. Key service provider firms labelled. **Right:** Unipartite Graph of the service provider firms radius of the node is proportional to the vendors Eigen vector centrality

4.2.2 Social Network Structure –unipartite

The unipartite projection of the bipartite graph allows us to examine the meta-network structure of two actors linked to each other through the common linkage with an actor of the other mode. For instance, two service providers are tied when they both contract for services with a common client. Average centralization measures for the clients’ unipartite graph and the service providers’ unipartite graph are compared to the overall bipartite graph in table 4.

	Bi-partite		Unipartite-Clients		Unipartite-Vendors	
	Degree	Normalized	Degree	Normalized	Degree	Normalized
Mean	2.51	0.01	115.49	0.62	8.10	0.06
St. Dev.	12.00	0.07	131.16	0.71	26.9	0.22
Min	1	0	0	0	0	0
Max	312	1.80	966	5.2	311	2.53
Network Centralization	1.79%		4.6 %		2.43%	
Normalized Network Centralization	1.19%		0.08%		2.97%	

Table 4 Network Description

Since the data is treated as binary ties for the paper, we compare the normalized network centralization to assess the extent of network activity in either unipartite graph. Normalized network centralization is measured as the sum of the difference between the maximum degree centrality and each nodes degree centrality divided by the maximum degree centrality.

5 ANALYSIS AND RESULTS

5.1 Network measures

In the interest of space, we present the set of network measures analyzed in the appropriate cells in the figure below.

H1: Mitigating service provider uncertainty allows longer contract duration	A: Vendors degree centrality in the two-mode network B: Vendors Eigen vector centrality in the two mode network
H2: Exposing service-related uncertainty can allow shorter contracts	C: Clients' degree centrality in the two-mode network
H3: Contracting with vendors that are reputed among other vendors will likely be of longer duration	D: Vendors' degree centrality in the one-mode network E: Vendors' Eigen vector centrality in the one-mode network of vendors

Table 5 Network Measures

5.1.1 Control Variables

The decision by firms to sign a contract of a particular duration can be affected by intrinsic factors of the firm such as firms' human and financial capital. In order to avoid the possibility that such firm specific factors drive the relationship between contract duration and network characteristics, we control for service provider characteristics such as number of employees, earnings margin, and revenue per employee. Similarly we control for client size as measured by number of employees and revenue.

5.2 Model estimation and results

As our dependent and independent variables are both node-level measures we use an ordinary least squares regression model with robust error correction for multi-way clusters (Cameron et al., 2008). The use of the multi-way cluster correction allows for controlling for heteroskedasticity introduced through the clustering of errors due to repeated service provider firms and client firms across the data. The dependent variable is the contract duration.

Model: Duration = $\alpha + \beta_1$ (network measure) + γ (Client specific control Variables) + δ (service provider specific control variables) + ε

Estimation results are presented in table 6 below⁴. We do not report the coefficients on the control variable in the interest of space. We find support for hypothesis 1 and 3 but not for hypothesis 2.

VARIABLES	Duration
Vendor 2-m normalized degree	1.08*** (.41)
Vendor 2-mode Eigen Vector	0.02* (.01)

⁴ In order to ensure robustness we considered different models with different error structures namely errors clustered by client firms, FGLS estimation and sample splits by high and low duration. The results have been generally consistent with the OLS model.

Client 2-m normalized degree			1.50 (7.04)		
Vendor 1-m normalized degree				0.75** (.54)	
Vendor 1-mode Eigen Vector					0.05*** (.02)
Constant	6.79***	7.39***	7.64***	6.68***	6.80***
Observations	430	430	430	430	430
R-squared	0.189	0.165	0.150	0.184	0.184

*** p<0.01, ** p<0.05, * p<0.1

Table 6 OLS Estimation results (robust standard errors accounting for multi-way clusters are reported in parentheses)

6 DISCUSSION

We find that the nature of reputational capital can play different roles in mitigating ex-ante uncertainty. The structural embeddedness of a vendor, within a network of clients and vendors, offers an indication of both vendors ability and the propensity to behave less opportunistically. The fact that the vendor manages many contracts would suggest that an opportunistic behavior with one client would easily be known to a large set of potential clients. Building on this observation we see that a vendors association with many clients is likely to lead to longer contract duration, we see that the vendors association to more central clients is also a significant indicator of longer contract duration.

The other channel by which vendors' reputation carries is the meta-network provided by network of vendors that share common ties. The association of a vendor to another vendor, albeit through a set of clients, offers an indication that the vendor belongs to a set of vendors, which if high in status, is a group in which the focal vendor may not wish to lose status in through opportunistic behavior.

In the case where the focal client can form a fairly informed opinion about the nature of the vendor but is unsure about the nature of uncertainty about the service itself, the strategy is clearly one of brokerage. The focal client's access to a pool of vendors places the client in a position to undertake competitive bidding so that uncertainty in service requirements is overridden at the cost of the vendor. Access to a set of vendors also provides the clients with opportunities to educate themselves on the service-related uncertainty by inviting prototypes from service providers. However in our current estimation we do not find support for this hypothesis. Perhaps controlling for the client firms' size removes the effect of status in the network.

7 LIMITATIONS

In the current version of the study we have identified a few data limitations and a few the empirical methods. In terms of data, relying on public information has its advantages and disadvantages. While we are exempt from biases associated with respondents' perceptions we are limited in the breadth of variables that can be studied. One could also argue that the publicly announced outsourcing arrangements are systematically different. However, we feel that vendors and clients in the industry are also recipients of the same public information and hence are likely to perform their mental calculus based on similar, if not the same, information.

Our current estimates pass the statistical tests of homoskedasticity and multicollinearity. However, passing the test of homoskedasticity only implies that the error structure assumed in the test is absent. Since there is no indication suggesting the exact nature of the covariance matrix we adopt an approach where we do not place any a priori assumptions on the error structure and instead perform a bootstrap estimation with multiple clusters in the error covariance matrix.

We currently do not account for the temporal changes in the network structure. Currently we are working on addressing this aspect. We also do not control for the specific services that are included in the bundle of services outsourced due to the there being limited theory on which bundle of services are likely to be more complex than the other. However given the large number of observations and the

lack of any obvious systematic association between duration and service type we assume service type to be orthogonal to the independent variables thus limiting the omitted variable bias. However this dimension does require investigation.

8 CONCLUSION

The aspect of reputation mitigating uncertainty has received some attention in the literature however to the best of our knowledge social capital as a measure of reputation in the context of ITO has yet to be examined. In the preliminary stage of this paper we find strong indication that our research framework is valid and that the hypotheses that emerge from the framework are testable. There are various directions that this work will be extended in further papers. We anticipate the ability to sort the ITO arrangements by the nature of service. It is foreseeable that our data can be split by the nature of services outsourced. For e.g. Transaction processing services are likely to fall under the quadrant where service uncertainty is low, while outsourcing knowledge work will likely be associated with higher service uncertainty. Based on such classification we can test if the reputational capital matter more for certain types of services than others. Given the rich literature available in sociology on the nature of social capital we envisage the development of richer theory in Information Systems on predicting the likelihood of contract design in the contemporary practice of Outsourcing and Offshoring.

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