Investigating Trust in Outsourcing: A Study in the Healthcare Industry

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Abstract

Trust is important consideration prior to adoption of outsourcing options and subsequently during the management of the outsourcing relationship. Understanding the antecedents to the adoption of information technology is important to both technology firms that provide services and the policy analysts that study the effects of technology adoption and IT success. The first portion of this essay looks at the role trust plays in the outsourcing relationship. Trust is discussed as both an antecedent to adoption and a critical part of the relationship post adoption. The second portion of this essay looks at a conceptual model of trust and privacy that is tested using PLS. The empirical study uses a transactional cost approach to investigate the role of trust and privacy, both as direct effects and as moderators in the adoption of Application Service Providers (ASPs) as a new form of information technology outsourcing. The study focuses on the healthcare industry. Results from the model indicate that trust plays a minimal role in the adoption of ASPs. Limitations of the research are discussed; implications are reviewed and future research areas are identified.
SECTION 1

Introduction

Outsourcing has matured since its inception in the early 90’s and has become an established solution within the business community (Aubert et al. 2004; Choudhury et al. 2003; Walsh 2003). Firms initially looked to outsourcing as a method to lower costs, gain access to skills not found internally, or to refocus on core activities; outsourcing is now becoming a growth-oriented strategic tool (Goo et al. 2000). Development of the industry has allowed firms to select options for outsourcing that range from arms-length contracts to strategic partnerships and long-term alliances. The form and function of outsourcing choices continues to evolve. The new areas for growth are in off-shore outsourcing and Application Server Provider (ASP) based outsourcing arrangements (Oh 2005).

The focus of much of this study lies in the healthcare industry. Outsourcing is not new to the healthcare industry; however, healthcare is one of the fields that lacks adequate up-to-date research concerning technology adoption and its use (Hikmet et al. 2003). The turbulent health care market (Lee et al. 1999; Madden 1999) has been inundated by declining margins, increased patient demands, restrictive legislation, and constant revisions to current legislation; resulting in confounding factors that influence the adoption and diffusion of innovations in the healthcare setting (Friedman et al. 2000). Innovative hospitals have previously outsourced janitorial services, food services, and nursing contracts. The healthcare industry increasingly views IT as a fundamental asset in providing health-related information services and decision support on demand, as well as in managing rising costs and changing organizational needs, improving the quality of health services and patient care, and fighting illness while promoting wellness (Raghupathi et al. 2002). With shrinking federal and state support for healthcare institutions, hospitals are forced to limit investments to proven technologies and risk aversion has become an underlying obstacle to new technology adoption. IT represents a substantial investment for most corporations and constitutes a significant aspect of organizational work (Agarwal et al. 2000).
Application Service Providers (ASP) have begun to provide outsourcing services to the healthcare industry. An ASP is defined as an information systems vendor that manages and distributes software-based services and solutions to customers across a wide area network (either using the Internet or a private network) from a central data center. Interestingly, the ASP model is a return to the “shared services via a mainframe” approach of the previous decade, where offsite hosting of software and data is managed by a third party. ASPs offering web-enabled software applications on a subscription (pay-as-you-go) basis revisits the traditional service bureau model of outsourcing, and promises additional business benefits of economies of scale, increased scope of business applications, and enterprise application integration (Currie 2003a).

While ASPs are a “shared service” derivative, they offer less expensive options to cash-strapped organizations that seek to embrace current technologies, therefore hospitals are an appealing market for the ASP industry (Serva et al. 2003). ASPs provide shorter implementation and deployment times; the scalability and ease of entry appeals to hospitals that have unpredictable financial outlooks and that are continually forced to make difficult choices. The ASP model ensures that the client has access to the technical expertise that is too costly to employ in-house; organizations are able to avoid new investments in hardware and software (Chen et al. 2002). Organizations with multiple information technology systems and various platforms are looking to external providers such as ASPs to streamline their operations and reduce non-compliance liability. Recent legislation has increased the IT demands on hospitals and has placed more emphasis on patient privacy concerns.

The ASP model has obstacles that have prevented its rapid industry-wide adoption. The ASP model puts the control of IT resources outside of the hospital’s control which raises issues of trust, data security, privacy, and governance. Controls for outcomes and behaviors evolve over the outsourced projects (Choudhury et al. 2003). Further, the nascent ASP industry is unable to provide evidence of a sustainable business model. Not all applications have web-interfaces, forcing ASP adopters to run two or more models. Access to outsourced applications may be subject to influences beyond the hospital’s control (heavy internet traffic, lack of web tone, hacking, ASP
The application software may not be industry specific and ASP applications may not integrate with internal systems. Also, service options and expectations are in the embryonic stage, requiring hospitals to pay more attention to details in their service level agreements (SLA). There is little formal literature that helps to demonstrate the distinctions between different ASP-client relationships and how they are managed (Kavan et al. 2002).

Trust is an important part of any exchange or transactional relationship; risk that is inherent in exchange transactions is mitigated by trust. Trust is vital to IT project success and deserves more discussion in outsourced projects (Natovich 2003). Defining trust is confusing (McKnight et al. 1998; Ring et al. 1994); previous research has investigated trust using single dimensional constructs but trust can also be viewed as a multi-dimensional construct combining specific beliefs that either directly or through an overall assessment of trust influence relevant behavioral intentions (Gefen 2002). Trust has been defined in many different ways, often reflecting the paradigms of the particular academic discipline of the researcher (Grabner-Kräuter et al. 2003). Trust is defined as the expectation that both parties in the exchange will not act opportunistically; trust is evident when vulnerability exists (Meyer et al. 1988), especially when forming new organizational relationships (McKnight et al. 1998).

Outsourcing involves two parties, the vendor and the client. For our research, trust can be defined as the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party; this definition of trust is applicable to a relationship with another identifiable party who is perceived to act and react with volition toward the trustor (Mayer et al. 1995). Vulnerability implies risk and trust mitigates that risk. Trust is crucial in the healthcare industry; confidentiality and security of a patient’s health information has always been important, even more so with the ease of electronic access (Huston 2001).

The Role of TRUST before adoption

Trust is important prior to adoption and during the management of the outsourcing relationship. The role of trust has been previous investigated as a basis for
a strong relationship that prevents opportunistic behavior (Lander et al. 2004; Zaheer et al. 1998); trust can play an effect in lowering the transaction costs associated with adoption risks (Uzzi 1997). Trust can reduce complexity especially when important decisions and new technology are being considered (Gefen 2002; Paul et al. 2004). Understanding the antecedents to the adoption of information technology outsourcing is critical to its long term success. Vendor trust has previously been identified as an antecedent in exchange relationships that involves risks and vulnerabilities (Barthelemy 2003; Hart et al. 1998; Sabherwal 1999) and is often the most cited inhibiting factor (Heart et al. 2001) to adoption of technology. Vendor trust is an important aspect of interorganizational relationships (Hart et al. 1998). Due to the difficulties in monitoring the opportunistic behavior of agents, risk associated with outsourced activity may make the firm vulnerable (Oh et al. 2003). Risks can be lowered with the presence of vendor trust. In alliances between companies, trust can lower the fear associated with opportunistic partners (Gulati 1998). Trust is difficult to develop in an outsourced project because of a lack of prior relationship (Natovich 2003).

With respect to the relationship between transaction costs and adoption, trust may play two roles: trust may directly affect the adoption or play a moderating role: this can be explained by looking at the definition of transaction costs. The negotiation and monitoring costs can be lowered in the presence of vendor trust. Similarly, the long term governance will be reduced and trust may actually increase with time to minimize the transaction costs. With respect to production costs, seeking vendors in the market to produce the services required exposes the organization to risk. The organization will be more likely to engage in external contracts in the presence of high trust. The management of the relationship builds trust that allows for other data security issues to be resolved.

Trust may emanate from the reputation and capability of the vendor. Organizations need to be reassured that in turbulent times, the vendors that they contract with can guarantee that they will not disappear or renege on service level agreements. The availability of reputable and trustworthy external IT providers in the market can also be a concern to firms seeking to adopt new technologies (Susarla et al. 2003). Vendor reputation is an antecedent to trust (Heart et al. 2004). The lack of
reputable vendors was previously found to dissuade adoption of new technologies (Ang et al. 1998).

Early research in outsourcing portrayed the external vendor relationship as adversarial in nature; they suggested that clients avoid partnership talk, refuse to sign incomplete contracts, hire outsourcing experts, measure everything, and include a termination clause (Lacity et al. 1995). In the initial stages, the costs involved and the complexity of the exchanges requires detailed contractual agreements; beyond contracts, trust is required (Hoecht et al. 2005). Reliance on trust may serve as a substitute for, or a complement to, more formal governance structures (Arino et al. 2001). Trusting relationships are difficult to develop under tight governance structures (Sabherwal 1999).

**The Role of TRUST in the relationship post adoption**

Trust is at the heart of all relationships (Gefen et al. 2003; Ring et al. 1994). The most important factor affecting success of outsourcing appears to be a mutual understanding between clients and their service providers (Kishore et al. 2003). The management of the relationship builds trust; outsourcing success requires that both the vendor and the client engage in active management of the relationship to ensure success. Previous research looked at why a client would adopt and addressed the concerns of the client (Koh et al. 2004). Trust in an organizational setting reduced complexity when new technology concerns emerge; trust is especially important in healthcare delivery (Paul et al. 2004). Interorganizational trust mitigates the information asymmetries inherent in inter-firm exchange by allowing for more open and honest sharing of information (Zaheer et al. 1998). Trust permits greater flexibility in the selection of governance mechanisms, resulting in closer relationships with less need for detailed contracts (Jeffries et al. 2000).

Outsourcing should be considered more as a management of relationships between service providers rather than a simple subcontract for IS commodities (Kishore et al. 2003). The relationship between the client and vendor evolves (Ilie et al. 2004). The supply-side of IT outsourcing remains under-researched in the academic literature (Seltsikas et al. 2002); research on the other side of the equation (vendor focus)
(Levina et al. 2003) and the ongoing management of the outsourcing relationship is minimal (Hu et al. 1997). Successful relationships increase trust and willingness to contract out services; unsuccessful relationships can poison the partnership and lead to termination. Previous research has shown that these relationships change and evolve over time due to changes in the external environment and in clients’ internal requirements (Kishore et al. 2003). Long-term relationship was found to be more successful than short-term arms length relationships (Lee et al. 2004).

The key to achieving benefits from outsourcing is maintaining positive client-supplier relationships (Alborz et al. 2004). Prior relationships with vendors can also affect adoption behavior. Trust can be increased if successful prior relationships exist; perceived risks can be lowered and existing relationships can be strengthened. A user’s satisfaction with an ASP is the result of the evaluation of the ASP’s services as a comparison with prior experiences (Susarla et al. 2003). Prior relationships that include positive outcomes and equitable treatment increase the chances of developing longer relationships (Ho et al. 2003). Relationship experience combines previous and current experiences with vendors to create a level of willingness within firms to use outsourced services. Relational quality (the extent to which partners feel comfortable with each other) is a function of past experiences and trust (Arino et al. 2001).

**Theoretical Framework**

Prior research in information technology outsourcing has shown that a primary reason for using external providers is the potential for cost savings (Ang et al. 1997; Aubert et al. 1996; Lacity et al. 1993; Lacity et al. 1998). In the classic “buy” or “build” decision from transaction costs theory (Coase 1937; Williamson 1991; Williamson 1996), organizations have to weigh the costs of creating and supporting their own IT structure and applications, or using ASPs to provide the services. The level of integration is determined by the relative costs of using the markets or employing resources within the firm (Rasheed et al. 2001). ASPs have been projected to reduce production costs in pure monetary terms for factors such as hardware, software and personnel costs. The transaction cost approach has been the basis of previous research in outsourcing of technology (Ang et al. 1998; Aubert et al. 2001; Ngwenyama
et al. 1999; Smith et al. 2003). ASPs provide organizations with relief from industry pressures by delivering expertise at fixed costs, relieving the shortage of skilled IT staff, and allowing internal IT departments to focus on new applications. They also reduce initial capital outlay, controllable fixed monthly costs, and provide lease or rent options. This frees up capital that would normally be allocated to costly hardware upgrades.

The overall impact of transactions costs was previously found to have no impact on the degree of outsourcing (Ang et al. 1998). As part of the Transaction cost economics theory, transaction costs are involved in exchanges between firms. These may include coordination costs, monitoring costs, negotiating costs, governance costs, etc. These costs act contrary to the benefits provided by the external vendor by highlighting the costs or risks that the organization must bear if it chooses to use an external provider for services. The costs negate the benefits of ASP adoption by creating concerns that lower the prospects of adoption.

Extending transaction costs, Agency Theory and the related Incomplete Contracts Theory (ICT) focus on trust and risk while Social Exchange Theory (SET) explores the relationships with vendors and their reputation/capability. The economic arguments that promote the adoption of ASPs cite cost savings as a key reason (Lacity et al. 1998; Smith et al. 2003). Agency theory (Eisenhardt 1989) extends the transaction costs notion by focusing on the actions of the parties in the relationship and the risks and motivations of each party. Trust and risk are significant to security; as the research on outsourcing matures, the focus is shifting from “why to outsource” to “how to manage the relationship.” Previous research has identified trust as a key factor in the outsourcing process (Sabherwal 1999) and has shown that contracts are needed to protect parties due to the emergence of new technologies or changes in the relationship (Beulen et al. 2003). A key assumption of ICT is that contracts are always "incomplete". These contracts have not covered all contingencies and scenarios (Hart et al. 1999).
SECTION 2

Influence of Transaction and Production Costs

Previous research in information technology outsourcing has shown that a primary reason for using external providers is the potential for cost savings (Ang et al. 1997; Aubert et al. 1996; Lacity et al. 1993; Lacity et al. 1998). In the classic “buy” or “build” decision from transaction costs theory (Coase 1937; Williamson 1991; Williamson 1996), hospitals have to weigh the costs of creating and supporting their own IT structure and applications, or using ASPs to provide the services. The level of integration is determined by the relative costs of using the markets or employing resources within the firm (Rasheed et al. 2001). ASPs have been projected to reduce production costs (of maintaining patient information and medical systems) in pure monetary terms for factors such as hardware, software and personnel costs. The transaction cost approach has been the basis of previous research in outsourcing of technology (Ang et al. 1998; Aubert et al. 2001; Ngwenyama et al. 1999; Smith et al. 2003). ASPs provide hospital IT departments with relief from industry pressures by delivering expertise at fixed costs, relieving the shortage of skilled IT staff, and allowing internal IT departments to focus on new applications. They also reduce initial capital outlay, controllable fixed monthly costs, and provide lease or rent options. This frees up capital that would normally be allocated to costly hardware upgrades.

Case Study Variables

Production Costs: Production costs advantages play a dominant role in outsourcing decisions (Ang et al. 1998). In structuring the functions of an organization, the goal is profit maximization through the efficient production of outputs from inputs. The firm will produce the output when it has a cost advantage of market structures; similarly, the market will provide efficient production mechanisms in areas that the firm is not dominant. Organizations should seek ASPs based on their ability to provide cost-effective solutions. In the context of IS, a firm will choose to outsource or insource based on the comparative costs of internalizing IS versus the price it has to pay vendors for the same IS services (Ang et al. 1998). As the ASP market matures, ASP
providers are able to increase client bases and achieve economies of scale. Research suggests that market-oriented structures can reduce costs from economies of scale and scope (Rasheed et al. 2001). The growth of ASP vendors also allows them to negotiate lower costs with the major software providers; these lower costs can then be passed on to the end users. At some point, the costs of renting software from an ASP will be more beneficial than the costs of producing internally. Higher internal productions costs will drive hospitals to seek alternatives in the current market. ASPs have been projected to reduce production costs (of maintaining patient information and medical systems) in pure monetary terms for factors such as hardware, software and personnel costs. Firms are more likely to outsource if the production cost advantages are high (Williamson 1981). Production costs include the hardware, software, and the IT labor resources needed to maintain internal production. ASPs operating with multiple clients can utilize their market-oriented structures to reduce costs and spread them over multiple clients. It is simpler for an ASP to maintain and update software packages than for a hospital IT department to keep up with frequent changes. As the software market becomes more skill-driven, the hospital may also have a difficult time attracting and retaining skilled IT employees.

**H1a: Higher Production Costs will positively influence ASP model adoption.**

**Slack Resources:** Organizations with high slack resources may choose to investigate the ASP model through use of slack resources, regardless of the cost implications. Slack resources allow the organization to investigate new innovations in technology that may give the organization an advantage in the marketplace. Previous research has shown that slack resources positively affect adoption behavior; organizations are able to investigate new technologies with excess resources. Organizations with slack resources may also seek to establish themselves as industry leaders through direct investments in their technological infrastructure. The level of investment in specialized equipment or the skills required to yield value from an asset can influence its adoption (Ang et al. 1997). Thus, the abundance of capital resources will allow organizations to investigate new technology and build internal IT capabilities. Organizations with high
slack resources will also have lower production costs concerns. These organizations will tend to explore new technologies, ignoring production costs arguments that favor external production. The success of organizations may provide them with the flexibility to absorb more risk based on their abundant resources (Rai et al. 1996). Innovative management may seek to build on internal skills and improve internal operations by using slack resources to make the organization more efficient.

*H1b: High Slack Resources will negatively influence Production Costs.*

**Transaction Costs:** Research in information technology outsourcing has shown that a primary reason for using external providers is the potential for cost savings (Ang et al. 1997; Lacity et al. 1993; Lacity et al. 1998). The overall impact of transactions costs was previously found to have no impact on the degree of outsourcing (Ang et al. 1998). As part of TCE, transaction costs are involved in exchanges between firms. These may include coordination costs, monitoring costs, negotiating costs, governance costs, etc. These costs act contrary to the benefits provided by the external vendor by highlighting the costs or risks that the organization must bear if it chooses to use an external provider for services. They negate the benefits of ASP adoption by creating concerns that lower the prospects of adoption. In the classic “buy” or “build” decision from transaction costs theory (Coase 1937; Williamson 1991; Williamson 1996), hospitals have to weigh the costs of creating and supporting their own IT structure and applications, or using ASPs to provide the services. The level of integration is determined by the relative costs of using the markets or employing resources within the firm (Rasheed et al. 2001). Transaction costs capture the costs incurred in negotiating, maintaining, or modifying the ASP contract. These costs can pose a significant threat to the viability of the ASP option, eroding perceived benefits. If the ASP customizes hospital software, transaction costs will be significantly higher.

*H2a: High Transaction Costs will negatively influence ASP model adoption.*

**Asset Specificity:** The uniqueness and specificity of an organization’s information technology applications and assets can impact a firm’s costs associated with the asset. Transaction costs, that later affect adoption behavior are themselves, increased by the
limited nature and usage of the asset. A resource can be defined as asset specific if ‘it cannot readily be redeployed’; IT resources are proprietary by nature and are highly asset-specific (Oh et al. 2003). The level of investment in specialized equipment or the skills required to yield value from an asset can influence its adoption (Ang et al. 1997; Nam et al. 1996). Legacy systems can be reduced or eliminated and old hardware can be sold for cash infusions to the hospitals (possibly even sold to the ASP). ASPs may have the greatest potential for organizations that are logistically or geographically disparate and/or administratively complex. Organizations with high asset specificity will seek to reduce their reliance on legacy systems and multiple platforms. Assets with high specificity can hinder redeployment of resources. Organizations with highly specific assets will seek more services from the ASP provider thereby increasing the transactions costs. The costs of deployment and maintenance of asset-specific resources can increase the negotiation costs and the service level costs from an ASP provider. Investments in specific assets lead to transaction costs (Aubert et al. 2004). The specificity of the organization’s assets will increase the costs to adopters and create barriers to adoption by increasing the costs of changing over the legacy systems or redeploying assets. Trust permits greater flexibility in the selection of governance mechanisms when asset specificity is present (Jeffries et al. 2000).

**H2b: High Asset Specificity will positively influence Transaction Costs.**

**Supplier Presence:** Hospitals are concerned with the long-term focus of their business. They need to be reassured that in turbulent times, the vendors that they contract with can guarantee that they will not disappear. Supplier presence reflects the paucity of available vendors in the marketplace. The lack of suitable suppliers can dissuade adopters (Ang et al. 1998). More suppliers reflect a growing industry with viable substitutes and new entrants willing to provide better services. The availability of reputable and trustworthy external IT service providers in the market can also be a concern to hospitals seeking to adopt ASPs (Ang et al. 1997). The supply-side of IT outsourcing remains under-researched in the academic literature (Seltsikas et al. 2002). The viability of the ASP model may dissuade potential adopters; the business model
remains immature and fundamentally flawed (Currie 2003b). As the ASP model matures. The industry will see the emergence of more clearly defined enterprise ASP offerings from key players in the software and computing services industry (Ekanayaka et al. 2002). Larger outsourcing contracts are awarded to reputable vendors with track records (Hoecht et al. 2005).

**H2c: High Supplier Presence will negatively influence Transaction Costs.**

**Moderating Influence of Trust and Privacy**

Moderators are important to the development of theory (Chin et al. 2003). The role of trust and privacy permeate the recent HIPAA guidelines. Considering the highly personal and potentially sensitive nature of medical data, there are significant risks to the confidentiality, integrity, and availability of such information (Zhang et al. 2002). The healthcare industry increasingly views IT as a fundamental asset in providing health-related information services and decision support on demand, as well as in managing rising costs and changing organizational needs, improving the quality of health services and patient care, and fighting illness while promoting wellness (Raghupathi et al. 2002). With shrinking federal and state support for healthcare institutions, hospitals are forced to limit investments to proven technologies and risk aversion has become an underlying obstacle to new technology adoption. This risk manifests itself as concerns over privacy of the patient information and the trust for the vendor. IT represents a substantial investment for most corporations and constitutes a significant aspect of organizational work (Agarwal et al. 2000).

**Vendor Trust:** Trust is important in health care delivery because health care providers rely on collaboration to reduce complexity (Paul et al. 2004). Vendor trust has previously been identified as an antecedent in exchange relationships that involves risks and vulnerabilities (Barthelemy 2003; Hart et al. 1998; Sabherwal 1999) and is often the most cited inhibiting factor (Heart et al. 2001) to adoption of technology. Risks can be lowered with the presence of vendor trust. Trust in an organizational setting reduces complexity when new technology concerns emerge; trust is especially important in healthcare delivery (Paul et al. 2004). With respect to the relationship
between transaction costs and adoption, trust may play a moderating role: this can be explained by looking at the definition of transaction costs. The negotiation and monitoring costs can be lowered in the presence of vendor trust. Similarly, the long term governance will be reduced and trust may actually increase with time to minimize the transaction costs. With respect to production costs, seeking vendors in the market to produce the services required exposes the organization to risk. The organization will be more likely to engage in external contracts in the presence of high trust.

**H3: Vendor Trust will moderate the relationship between Transaction and Production Costs and ASP model adoption.**

**Privacy Protections:** Confidentiality and security of a patient’s health information has always been important, even more so with the ease of electronic access (Huston 2001). The adoption of technology must adequately protect patient privacy without exception. Privacy protections included improper access protections and unauthorized usage protections. Improper access protections refers to the protection of the data at the organization or at the ASP vendor site, and encompasses both technological constraints and organizational policy (Smith et al. 1996). Healthcare workers are very cognizant about possible abuses in the form of unauthorized or inappropriate access to medical records that contain personal information (Baumer et al. 2000). Unauthorized secondary usage refers to the inappropriate use of stored information at the ASP vendor site. The usage is specific to external concerns over data disclosed to third parties other than those included in the contract (Smith et al. 1996). ASP models that protect against the unauthorized usage and the improper access of information will be more likely to positively influence adoption. With respect to the relationship between transaction costs and privacy protections, privacy concerns may play a significant moderating role in the negotiation of data security, storage, information transfer, and privacy protections can be defined in the service level agreements. With respect to production costs, seeking vendors in the market to produce the services required exposes the organization to risk. The organization will expect to have privacy protection equivalent or greater than the internally available protections.
H4: Privacy protections will moderate the relationship between Transaction and Production Costs and ASP model adoption

Methodology & Results

Study Context & Sample
A mail survey was developed based on outsourcing literature (Ang et al. 1998; Lacity et al. 1998); content validity was established by the use of previously validated variables (See Table 1). Content validity was also established through individual interviews with IT professionals in the hospital industry. The survey instrument was developed from previous research and included various refinement procedures (Dillman 2000). Initial survey constructs and questions were pre-tested with 8 health experts, 2 MIS professors, and 4 PhD candidates. This was done to review the survey instrument for clarity, completeness, and readability. A pilot test was conducted using a random sample of IT professionals. Eighty-four (84) surveys were mailed resulting in 29 useable responses with 12 surveys returned for incorrect information. The raw response rate was 34.5% while the adjusted was 40.3%. The internal consistency (Cronbach’s alpha) for the pilot data was calculated with results ranging from 0.5903 to 0.9407. Factor analysis was used to verify discriminant validity; items with a factor rating below 0.5 were dropped.

The full survey was sent to 3450 senior level IT hospital executives. A five-week cutoff was established for the first wave of responses; a follow-up reminder card was mailed at the end of the 5 weeks to increase participation. The overall response rate was 6.5% (223 surveys); this was low but not surprising considering the limitations of mail surveys and the nature of healthcare response rates. In studying IT in healthcare, a response rate of 30% in mail surveys is rare, and response rates between 5% and 10% are more common (Hikmet et al. 2003). There were 89 completed surveys returned (53 adopters, 36 non-adopters); there were an additional 84 surveys returned indicating that the organization was “aware” of ASPs but had not moved beyond that stage. These were NOT used in the calculations because the respondents had not
completed the rest of the survey. There were also 50 excluded surveys with missing data that was not used in the PLS model.

Table 1. Survey response by adoption category

<table>
<thead>
<tr>
<th></th>
<th>Completed Surveys</th>
<th>Incomplete Surveys</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adopters</td>
<td>53</td>
<td>0</td>
<td>53</td>
</tr>
<tr>
<td>Non-Adopters</td>
<td>36</td>
<td>84 (awareness only)</td>
<td>120</td>
</tr>
<tr>
<td>Missing Data</td>
<td>0</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Total</td>
<td>89</td>
<td>134</td>
<td>223</td>
</tr>
</tbody>
</table>

Table 2. Survey response by adoption level

<table>
<thead>
<tr>
<th></th>
<th>Completed Surveys</th>
<th>Surveys with only Adoption Stages Completed</th>
<th>TOTALS</th>
<th>Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Awareness OR Other</td>
<td>17</td>
<td>84</td>
<td>101</td>
<td>58%</td>
</tr>
<tr>
<td>Interest</td>
<td>12</td>
<td>0</td>
<td>12</td>
<td>7%</td>
</tr>
<tr>
<td>Evaluation</td>
<td>4</td>
<td>0</td>
<td>4</td>
<td>2%</td>
</tr>
<tr>
<td>Trial &amp; Reject OR Discontinuance</td>
<td>3</td>
<td>0</td>
<td>3</td>
<td>2%</td>
</tr>
<tr>
<td>Commitment</td>
<td>16</td>
<td>0</td>
<td>16</td>
<td>9%</td>
</tr>
<tr>
<td>Limited Deployment</td>
<td>28</td>
<td>0</td>
<td>28</td>
<td>16%</td>
</tr>
<tr>
<td>General Deployment</td>
<td>9</td>
<td>0</td>
<td>9</td>
<td>5%</td>
</tr>
<tr>
<td>Total</td>
<td>89</td>
<td>84</td>
<td>173</td>
<td>100%</td>
</tr>
</tbody>
</table>

Figure 1. Conceptual Model
Construct Operationalization

Table 3. Survey items and sources

<table>
<thead>
<tr>
<th>List of Survey Variables</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>Size (Kimberly et al. 1981)</td>
</tr>
<tr>
<td>Independent</td>
<td>Production Costs (Ang et al. 1998)</td>
</tr>
<tr>
<td></td>
<td>Transaction Costs (Ang et al. 1998)</td>
</tr>
<tr>
<td></td>
<td>Supplier Presence (Ang et al. 1998)</td>
</tr>
<tr>
<td></td>
<td>Asset Specificity (Ang et al. 1998)</td>
</tr>
<tr>
<td></td>
<td>Slack Resources Adapted (Miller et al. 1982)</td>
</tr>
<tr>
<td></td>
<td>Privacy Protections (Smith et al. 1996)</td>
</tr>
<tr>
<td></td>
<td>Vendor Trust (Bharadwaj et al. 1999)</td>
</tr>
<tr>
<td>Dependent</td>
<td>Adoption (Ettlie et al. 1979; Fichman et al. 1997)</td>
</tr>
</tbody>
</table>

Adopters can be found at various stages in the process of adoption of new technology. These stages include Ettlie’s five-stage model (Ettlie et al. 1979), the common three-step adoption [initiation, adoption, implementation] (Rogers 1995), and the six-step model (Fichman et al. 1997). For our research, we applied a seven-stage adoption model (Ettlie et al. 1979; Fichman et al. 1997). This model’s stages included: awareness, interest, evaluation, trial & reject, commitment, limited deployment, and general deployment. The use of a seven stage model allows for richer data analysis. The direct effects of transaction costs and production costs are not investigated at each stage but captured in a manner that reflects the concerns of the organization and the level of adoption at the time that the survey was completed. Respondents replied with their concerns at the level of adoption stage that they were currently in. This gives us more data than a simple binary adoption variable. For example, a firm may decide to discontinue its operations based on transactions costs that become more transparent as the negotiation process progresses.

Bounded rationality may have not provided all the production or transaction costs to the organization at the time of adoption. Similarly, a firm that is cautious may be at a limited deployment stage while investigating the ASP process and building a relationship with the vendor. Vendor trust will then vary based on the level of adoption stage and the experience with the vendor. Size has been linked to adoption behavior (Hoffman et al. 1996; Rai et al. 1993). While larger organizations are more innovative due to their flexibility to absorb risk (Sharma et al. 2003), research in outsourcing
suggests that size is negatively correlated with the tendency to outsource (Chen et al. 2002). We expect size to have no impact on adoption. Size was measured using the number of licensed beds reported (Irwin et al. 1998; Kimberly et al. 1981).

**Data Analysis**

**Table 4. Composite Reliability and AVEs**

<table>
<thead>
<tr>
<th>Variable</th>
<th># Items</th>
<th>Composite Reliability (Composite Validity)</th>
<th>Discriminant Validity (AVE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vendor Trust</td>
<td>8</td>
<td>0.958</td>
<td>0.743</td>
</tr>
<tr>
<td>Privacy Protections</td>
<td>7</td>
<td>0.951</td>
<td>0.738</td>
</tr>
<tr>
<td>Slack Resources</td>
<td>4</td>
<td>0.797</td>
<td>0.504</td>
</tr>
<tr>
<td>Transaction Costs</td>
<td>3</td>
<td>0.873</td>
<td>0.696</td>
</tr>
<tr>
<td>Production Costs</td>
<td>5</td>
<td>0.855</td>
<td>0.544</td>
</tr>
<tr>
<td>Asset Specificity</td>
<td>5</td>
<td>0.910</td>
<td>0.672</td>
</tr>
<tr>
<td>Supplier Presence</td>
<td>3</td>
<td>0.895</td>
<td>0.740</td>
</tr>
</tbody>
</table>

Interaction analysis of moderators was the basis of recent research (Chin et al. 2003). PLS has been used previously in IS research (Agarwal et al. 2000; Chin 1996; Compeau et al. 1995; Gefen et al. 2000; Venkatesh 2000) and is appropriate due to the minimal demands on sample size (Agarwal et al. 2000; Chin 1996) and measurement scales. The stability of the estimates (the effect of noise) was tested via the bootstrap resampling method. Composite reliability and discriminant validity (AVE) scores are reported (see Table 2). The Sqrt(AVE) and the correlations were checked and found to be within expected limits (see Table 5). The standardized coefficients represent the relative strength of the statistical relationship (Gefen et al. 2000). The variables were reflective with size as the control variable. The number of licensed beds was chosen to represent Size in the PLS model. The tax status of a hospital had previously been shown to correlate with the adoption of technology innovations (Hoffman et al. 1996); this was checked in our data and the correlation was found to be insignificant (Correlation = 0.125, Sig. = 0.246). Eighty-nine surveys were used for the PLS calculations.
Results of Direct Effects

There were significant results \( (R^2 = 0.135) \) in the direct model – model 1 (See Table 3). Support was found for hypothesis (H1B, H2A, H2B, and H2C). No significant support was found for H1A. Hospitals with slack resources were more likely to investigate ASPs and were less vulnerable to industry changes. The presence of reputable supplier and the reliability of the supplier significantly affected Transaction Costs. With the introduction of Privacy and Trust as direct effects on adoption – model 2, the results (See Figure 2) did not change except that Trust showed a slight significance. Slack Resources contributed to Production costs even though Production Costs were not significant \( (R^2 = 0.198) \); Asset Specificity, and Supplier Presence were significant antecedents to both Transaction Costs \( (R^2 = 0.239) \); overall change in \( R^2 \) was 0.023. Transaction costs were significant while Production Costs, once again, did not show any significance in our sample. If you consider the ASP model as a variation of outsourcing, then the negotiating and coordination components of Transaction Costs were more important to healthcare organizations.

Vendor Trust was slightly significant with its impact on adoption behavior while Privacy Protections were not significant. This can be explained by the fact that adopters have service agreements that set protection guidelines; privacy protections can be implied in the contract and therefore are not as much of a concern as trust. The minimal impact of trust (T-value – 1.80) was concerning. Trust was expected to play a significant role in adoption behavior. Trust limits the opportunistic behavior in interorganizational relationships (Sabherwal 1999).
Figure 2. Research model results for direct effects

Table 5. Direct model using PLS

<table>
<thead>
<tr>
<th></th>
<th>Coeffic.</th>
<th>Results</th>
<th>Coeffic.</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prod. Costs</td>
<td>0.084</td>
<td>No Effect</td>
<td>0.051</td>
<td>No Effect</td>
</tr>
<tr>
<td>Slack Res.</td>
<td>-0.445****</td>
<td>Strong</td>
<td>-0.445****</td>
<td>Strong</td>
</tr>
<tr>
<td>Trans. Costs</td>
<td>-0.310***</td>
<td>Strong</td>
<td>-0.289**</td>
<td>Strong</td>
</tr>
<tr>
<td>Ass. Spec.</td>
<td>0.243***</td>
<td>Strong</td>
<td>0.243***</td>
<td>Strong</td>
</tr>
<tr>
<td>Sup. Pres.</td>
<td>-0.385****</td>
<td>Strong</td>
<td>-0.385****</td>
<td>Strong</td>
</tr>
<tr>
<td>Size</td>
<td>-0.054</td>
<td>No Effect</td>
<td>-0.021</td>
<td>No Effect</td>
</tr>
<tr>
<td>Trust</td>
<td></td>
<td></td>
<td>0.166*</td>
<td>Support</td>
</tr>
<tr>
<td>Privacy</td>
<td></td>
<td></td>
<td>-0.008</td>
<td>No Support</td>
</tr>
<tr>
<td><strong>R2</strong></td>
<td><strong>0.135</strong></td>
<td></td>
<td><strong>0.158</strong></td>
<td></td>
</tr>
</tbody>
</table>

* p<0.10  ** p<0.05  *** p< 0.01  **** p<0.001
Results of Moderated Effects

Hypothesis 3 and 4 reflected the moderating effects of trust and privacy on both production and transaction costs respectively. To assess the moderating effects of Trust and Privacy on Transaction and Production Costs, three models were tested: the first model investigated all variables for interactions (see Figure 2); the second and third investigated Trust and Privacy separately. PLS latent scores were used to calculate the interaction scores. The effects of Privacy ($R^2 = 0.152$) and Trust ($R^2 = 0.159$) separately were minimal and did not show any significant interactions in the results; Transaction costs were still the predominant significant variable while Production costs did not change. Privacy and Trust had no moderating effect on the cost variables. The full model with all the interactions ($R^2 = 0.180$) reflected the direct model results with no moderation effects seen.

Figure 3. Research model (FULL MODEL) results for interaction effects
<table>
<thead>
<tr>
<th></th>
<th>FULL MODEL</th>
<th>PRIVACY ONLY</th>
<th>TRUST ONLY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production Costs</td>
<td>0.040</td>
<td>0.024</td>
<td>0.073</td>
</tr>
<tr>
<td>Slack Resources</td>
<td>-0.445****</td>
<td>-0.445****</td>
<td>-0.445****</td>
</tr>
<tr>
<td>Transaction Costs</td>
<td>-0.307**</td>
<td>-0.330**</td>
<td>-0.279**</td>
</tr>
<tr>
<td>Asset Specificity</td>
<td>0.243***</td>
<td>0.243***</td>
<td>0.243***</td>
</tr>
<tr>
<td>Supplier Presence</td>
<td>-0.385****</td>
<td>-0.385****</td>
<td>-0.385****</td>
</tr>
<tr>
<td>Size</td>
<td>-0.033</td>
<td>-0.033</td>
<td>-0.016</td>
</tr>
<tr>
<td>Trust</td>
<td>0.127</td>
<td></td>
<td>0.146</td>
</tr>
<tr>
<td>Privacy</td>
<td>0.018</td>
<td>0.052</td>
<td></td>
</tr>
<tr>
<td>Trust X Prod. Costs</td>
<td>-0.067</td>
<td></td>
<td>-0.050</td>
</tr>
<tr>
<td>Trust X Trans. Costs</td>
<td>0.066</td>
<td></td>
<td>-0.001</td>
</tr>
<tr>
<td>Privacy X Prod. Costs</td>
<td>0.153</td>
<td>0.154</td>
<td></td>
</tr>
<tr>
<td>Privacy X Trans. Costs</td>
<td>-0.026</td>
<td>0.063</td>
<td></td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.180</td>
<td>0.152</td>
<td>0.159</td>
</tr>
</tbody>
</table>
Discussion

The results show that transaction costs are key significant driver of adoption of ASPs in the healthcare industry. There was some support for the effects of Vendor Trust as a direct driver of the adoption decision. Even though the results of this study show no significant moderating impact of trust and privacy, these variables continue to be of concern with adoption and more importantly, within the healthcare environment. Moderators may be included in the service level agreements affecting decisions prior to adoption. The HIPAA guidelines require that covered entities that use business associates must provide satisfactory assurances to safeguard protected health information. This provision may force privacy and security concerns to be addressed prior to adoption.

We expected to see significant interactions effects; the theory of transaction costs analysis implies that transactions costs reflect the risk and uncertainty within the market. Trust should have an impact on negotiation and coordination processes with ASPs. This impact shows up in the direct model on adoption. The overall size effect was calculated as 0.02 (between the full model and the direct) with 0.02 as small, 0.15 as moderate, and 0.35 as large (Chin et al. 2003); the effects of the interactions were small. Further examination of the dataset showed numerous duplication of hospital systems with overlapping roles; the mailing list showed individuals that were part of the same system. This would further improve the response rate calculations.

Trust may have not shown up in the data because of the implied governance mechanisms in the contract. For initial adoption, prior negotiations between parties may have been proactive in creating benchmarking and reporting mechanisms together with acceptable performance levels. The concern of the vendor is to meet the levels agreed upon by the client. Trust may develop post adoption as the vendor and client interact and share information. Service levels may change and the client may have different needs; addressing these needs in a timely manner may improve the relationship and first build interpersonal trust between the vendor employees and the client employees; this trust may spillover into organizational trust that solidifies the relationship as mutually beneficial.
Implications

An interesting result is the strength of transaction costs versus production costs. In earlier research by Ang and Straub (Ang et al. 1998), production costs were more significant than transaction costs. The ASP model follows a similar pattern but transaction costs have a much bigger impact in this study. The maturing outsourcing model may have shifted the focus from make vs. buy concerns to transaction costs with the ASP. The use of a seven-stage adoption model is innovative and allows the results to reflect the concerns of the organization and the level of adoption at the time that the survey was completed. Building on the TCE concepts of uncertainty, bounded rationality, and information asymmetry, the seven-stage model provides stages of adoption that can be correlated to the response to the survey items. The lack of support for interaction effects may reflect the small data set. Future research will collapse the seven stages into four to improve the strength of the results and improve the research on adoption as a multi-level dependent variable. Trust and Privacy may indeed be covered under service level agreements with the vendor and may not be linked to transaction and production costs. The discussion of patient privacy and trust will continue to be the focus of future research; the prevalence of the Internet will drive more technology into the healthcare industry. Future research will also need to examine non-linear effects of the predictor variables on adoption.

The study sample may be a key limitation with respect to causal implications of the results. The small sample size may have influenced the results. The composite reliability and discriminant validity results were not strong. Under small sample sizes, there is a known bias for PLS to overestimate the measurement loadings and underestimate the structural paths among constructs (Agarwal et al. 2000; Chin et al. 2003). Future research will need to reexamine the data once a significant sample has been achieved. The survey instrument was long and required various answers that may have led to low return rates. Some questions required actual financial data that may have been unavailable to the respondent, or data that was not something the hospital wanted to share. This could have caused survey recipients to forego completing the survey or to return incomplete surveys. Another issue was the timing of the survey distribution; surveys were distributed in the middle of December and that
may have crossed many CIO desks during the holiday/vacation period. Organization with no interest in adopting ASPs could have ignored the study (some justification comes from the numerous respondents that were aware of ASPs but failed to complete the survey).
Future Research

This in no way comprises the full set of possible variables that may explain adoption behavior. Interactions between several variables may account for more causality. Trust may have multiple influences (direct, moderating, or as an antecedent to other second order variables). Future research should examine the inter-relationship between the constructs and the various models for best fit. Trust requires work prior to outsourcing and during the relationship. Maintaining a long-term relationship will depend on the preparation that an organization makes before developing the relationship (Willcocks et al. 1995). Recent research has shown that trust building mechanisms differ between vendor and client. Client senior management and project team members report that the fulfillment of promises is crucial to the development of trust, yet the outsourcing vendor does not share this view; for the outsourcer, fulfillment of promises is an artifact of a contractual relationship and both parties differ regarding what signals trust-building behavior (Lander et al. 2004). The study makes theoretical and empirical contributions to the outsourcing literature. Longitudinal research on trust after the adoption combined with pre-adoption data should be conducted to provide validity to the research.


Sabherwal, R. "The role of trust in outsourced is development project," *Communication of the ACM* (42:2) 1999, pp 80-86.


Table 5. Correlation matrix and SQRT(AVE)

<table>
<thead>
<tr>
<th>Supplier Presence</th>
<th>Slack Resources</th>
<th>Size</th>
<th>Adoption</th>
<th>Production Costs</th>
<th>Transaction Costs</th>
<th>Asset Specificity</th>
<th>Trust</th>
<th>Privacy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supplier Presence</td>
<td>0.860</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Slack</td>
<td>-0.308</td>
<td>0.711</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Size</td>
<td>0.039</td>
<td>-0.068</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adopt</td>
<td>0.156</td>
<td>0.085</td>
<td>-0.092</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Product</td>
<td>0.422</td>
<td>-0.359</td>
<td>-0.190</td>
<td>0.213</td>
<td>0.748</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trans</td>
<td>-0.424</td>
<td>0.329</td>
<td>0.062</td>
<td>-0.353</td>
<td>-0.442</td>
<td>0.834</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asset</td>
<td>-0.173</td>
<td>0.407</td>
<td>-0.001</td>
<td>-0.050</td>
<td>-0.173</td>
<td>0.289</td>
<td>0.822</td>
<td></td>
</tr>
<tr>
<td>Trust</td>
<td>0.103</td>
<td>-0.180</td>
<td>-0.258</td>
<td>0.245</td>
<td>0.309</td>
<td>-0.244</td>
<td>-0.099</td>
<td>0.863</td>
</tr>
<tr>
<td>Privacy</td>
<td>0.324</td>
<td>-0.041</td>
<td>-0.193</td>
<td>0.162</td>
<td>0.399</td>
<td>-0.413</td>
<td>-0.022</td>
<td>0.343</td>
</tr>
</tbody>
</table>