

Mediating Role of Trust Brief in SMEs' Strategic Choice of Cloud Service

Full Paper

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Abstract

This study draws on organizational-environmental framework and trust research to investigate SMEs' transformation toward cloud service. This study regards cloud service transformation as a strategic choice of SMEs and highlights organizations' trust based rationality. This study develops a research model in which SMEs' trust belief on cloud service mediates the effects of the organizational-environmental determinants on SMEs' strategic choice. A survey involving 107 Chinese SMEs was conducted to validate the research model. The results from empirical data provide strong supports on the hypotheses. Theoretical and practical implications are discussed.

Keywords

Cloud service, Innovation adoption, Trust belief, Organizational-environmental framework

Introduction

Cloud computing has grown enormously. It is a style of computing in which scalable and elastic information technology (IT) related capabilities are provided as a service to customers, using Internet technologies (Mell and Grance 2009). It enables convenient, on-demand network access to a shared pool of configurable computing resources (e.g. networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. Under this innovative computing paradigm, cloud services at different levels are arising on the marketplace. Cloud service offers a new framework for organizations to develop their information technology (IT) competence. Such an IT innovation enables organizations to transform from the conventional mechanism of in-house development into a wholly new cloud enabled business environment.

Cloud service is especially beneficial for small and medium-sized enterprises (SMEs), regarding that it has potential to alleviate the historical IS challenges facing SMEs such as stretched IS management capabilities, few technically skilled employees, tight access to financial capital and few slack resources (Salmeron and Bueno 2006; Street and Meister 2004). Lacity and Reynolds's (2014) multiple case studies illustrate that SMEs are getting great economic and business value from cloud services, including cost avoidance, cost savings, rapid deployment, scalability, management simplicity, and better resiliency

compared to in-house IT provision. The role of SMEs in cloud marketplace is particularly salient in emerging economies, such as China, India, South Africa, etc. However, recent research reveals that many SMEs from these regions are still on the fence of transforming toward cloud services (Kshetri 2016). More important, prior research on cloud service adoption is primarily based on the cost-benefit aspect (e.g., Subramanian et al. 2014), but this simple economic rationality cannot adequately explain the phenomenon of indecisive SMEs. Hence, it is necessary to seek for more aspects to explain why and how SMEs transform toward cloud service.

Organizations' acceptance of IT innovations needs strategic intent. Facing an IT paradigm shift, SMEs' strategic choice of transformation is more likely to be determined by their inherent characters such as entrepreneurship. Organizations with a higher level of proactiveness and entrepreneurship are more open to IT innovations (Frambach and Schillewaert 2002; Hurley and Hult 1998). In regard of cloud service, security is a key issue for SMEs (Brender and Markov 2013). Prior studies have claimed that security of online transactions is the common concern both for service vendors and their clients (Straub et al. 2002), especially in the cloud environment. Cloud computing is the least transparent externally provided service method "storing and processing your data externally in multiple unspecified locations, often sourced from other, unnamed providers, and containing data from multiple customers" (Heiser and Nicolett 2008). All these increase the uncertainty and risks for organizations' business operations. As service clients, SMEs may feel more secure on a cloud market that has more vendors. Further, SMEs may also expect that the contextual conditions such as promises, contracts, regulations, and guarantees are in place to assure the service quality. Such assurance comes from the regulative environment including service vendors, industries, and governments.

No matter inherent organizational characters, relational characters, or external environmental characters provide momentums to stimulate the SMEs' strategic choice of cloud service. These drivers consistently point to a crucial issue of trust belief building for SMEs. Trust is especially critical for organizations' transformation decision on cloud service, regarding that cloud service is built on a foundation of sharing and reflects a spectrum of things complementing one another. Trust belief building not only shapes a new form of organizations' rationality which is distinguished from the technical-economic rationality, but also reflects the organizational psychology. Organizational decision is always a complex process, in which inherent and environmental characters influence organizations' tension on the cloud-driven new IT paradigm. However, the extant cloud-related studies have seldom explicitly explained how the trust based rationality influence SMEs' transformation toward cloud service. The development of trust belief can be an important intervention between the organizational-environmental determinants and SMEs' strategic choice of cloud service. Therefore, this study emphasizes the trust-based rationality and aims to propose a model that can depict how the relevant organizational-environmental determinants affect SMEs' trust beliefs and their strategic choice of cloud service. This new angle will contribute the IT innovation adoption literature and cloud computing research as well.

The paper is structured as follows: first, theoretical background and related literature of this study are reviewed. Thereafter, the research model and hypotheses are elaborated. Subsequently, methodology and data analysis process are presented. Key findings and implications of this research are thoroughly discussed. Finally, the paper draws a short conclusion and points out the limitations and future work.

Literature review and Theoretical background

Organizational-Environmental Framework

The Technology-Organization-Environment (TOE) paradigm identifies three broad aspects, i.e., technological, organizational and environmental aspects which have impacts on IS related decisions and the uses of technological innovations firms. IS studies have based on to investigate the post-adoption variation in usage and value of e-business by organizations (Zhu and Kraemer 2005). TOE framework has also been applied to cloud computing technology by mainly attributing cloud computing adoption in SMEs to the technological factors such as reliability, complexity, compatibility, trialability, results observability, relative advantages of cloud computing etc., and the economic rationality based organizational factors such as perceived benefits, cost reduction, IT competence, organizational readiness, competitive forces (Gupta et al. 2013; Low et al. 2011). The TOE framework provides insight for analyzing the determinants of IT innovation acceptance and diffusion. However, the existing literature on cloud

service adoption is mainly based on the assumption of the technical-economic rationality of organizations. The technological factors have been thoroughly investigated while the organizational and environmental determinants of organizations' strategic choice of cloud service have not been fully understood. Therefore, this study focuses on the organizational-environmental framework from new perspectives.

The organizational aspect usually refers to the organizational readiness and the amount of slack resources available internally (Zhu and Kraemer 2005). This is rooted in the resource based view and falls in the assumption of organizations' technical-economic rationality. Furthermore, SMEs' available resources may not vary much in terms of scale due to the similar business size. New perspectives are needed to expand and enrich the organizational aspect. Regarding transforming toward a new paradigm of cloud service is strategic choice for SMEs, a strategic perspective that has been largely ignored in prior research provides new insight to look at the strategic determinants. The strategic choice theory (Child 1997) postulates that organizations' decisions largely depend on their internal strategic orientation. More proactive strategy such as entrepreneurship makes organizations more open to innovations and be willing to invest specific efforts. Prior research have demonstrated the strong impact of organizational entrepreneurship on innovation (Slater and Narver 1995). The efforts of organizations' development of asset specificity has also been shown as an important driver of organizations' embracing innovations (Subramani 2004).

The environmental aspect refers to the arena in which business is conducted, such as the industry, competitors, and government (Zhu and Kraemer 2005). On the cloud service vendor side, the cloud service market maturity that is indicated by the availability of service vendors or other support capabilities is important for client firms to adopt or continue to use the service. On the cloud service client side, the client's need for organizational legitimacy fosters the emergence of norms and practices that prove the innovation diffusion. Further, the environmental factor such as the structural assurance from the vendors, industrial regulators and governments will generate substantial influences on SMEs' perception and recognition on the general cloud services.

Trust research

Trust-based rationality is a vital perspective for understanding IT acceptance and use phenomenon in organizational context. Not all real world settings for transaction are dominated by values such as self-interest and opportunism, trust should also be considered to provide adequate explanations for organizational IT innovation acceptance and diffusion (Kumar et al. 1998). Trust belief is a core premise of a positive relationship in various contexts (McKnight and Chervany 1996), which could help to facilitate win-win cooperation strategy and thus to improve transaction efficiency.

Trust belief building is a cognitive process in which direct experience and second-hand knowledge, impressions and cognitive cues will affect the trust formation (Brewer 1981; Li et al. 2008). For an IT-led service innovation, SMEs may not be familiar with the technological attributes of cloud computing, therefore their trust towards cloud service are more likely to come from the organizational-environmental aspects. From the organizations' strategic choice perspective, SMEs' inherent entrepreneurship can make the organizations open to IT innovations and be willing to adventure in new areas of businesses that can be brought by cloud services, leading to a strong trust belief of cloud service. The efforts specifically invested to maintain the vendor-client relationship is also a strategic action, which can strengthen SMEs' trust belief on cloud service. From the environmental scanning perspective, the market situation and regulative situation will exert external influence on SMEs' trust belief on cloud service. A mature cloud service marketplace with an adequate number of reputable service vendors will deliver the market confidence to SMEs and make them believe the new service mode is trustworthy. On the opposite, the service vendor scarcity negatively influences SMEs trust belief on the new market and the service paradigm. Also, scanning the structural assurance and regulations of the whole cloud service market can also affect the trust belief on the cloud service. The perceived structural assurance from vendors' promises and contracts, industrial regulation and governmental policies may make SMEs feel secured and guaranteed on the service.

Research model and Hypotheses

Under the logic of trust-based rationality, this study focuses and refreshes the organizational-environmental framework by incorporating the strategic, relational, market, regulative elements to find

out critical determinants of SMEs' trust beliefs and the sequent strategic choice of cloud service. We argue for the mediating effect of trust belief between organizational-environmental determinants and the ultimate strategic choice of SMEs. We develop a model as shown in Figure 1. We will elaborate each hypothesis in the following sub-sections.

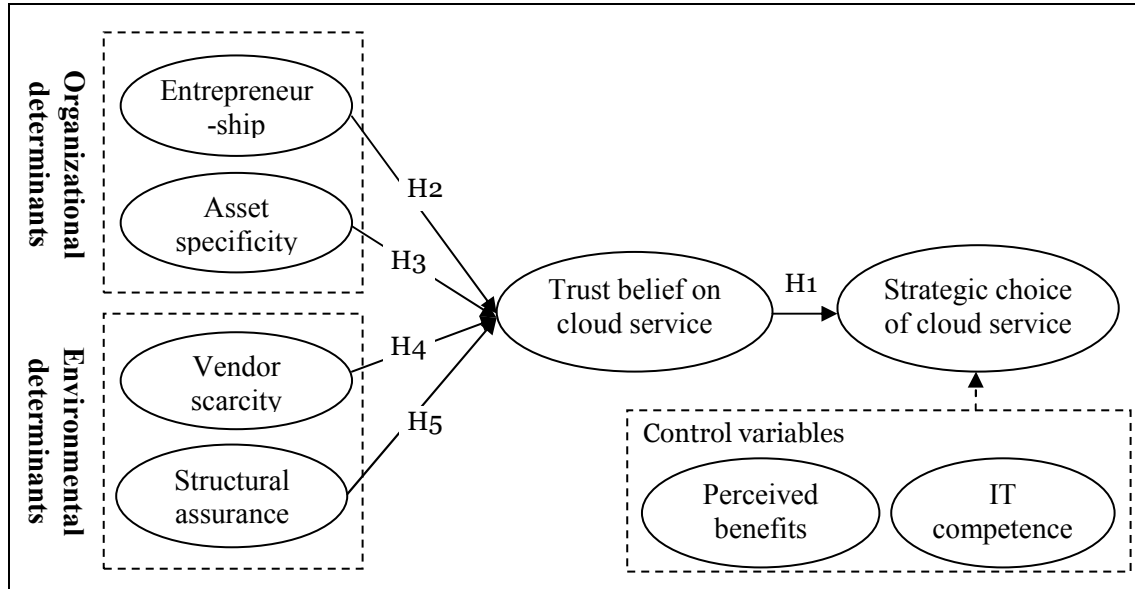


Figure 1. Research model

Direct effect of Trust

Trust is a subjective belief that the trustee will behave in the interest of the truster within a transaction, i.e., trust belief. In this study, trusters are SMEs that are facing strategic choice of transforming toward cloud service, whereas the trustee refers to the cloud service. Consistent with prior trust research (Gefen et al. 2003; Goo et al. 2009; Pavlou and Gefen 2004), this study defines the trust belief on cloud service as the degree to which the organizational users (i.e., SMEs) believe that the cloud service is a dependable IT service usage mode. Trust has been extensively examined as an crucial factor that can directly and significantly affect the behavioral intention (Komiak and Benbasat 2006; McKnight et al. 2011; Rustagi et al. 2008). Trust can increase organizations' performance expectancy and reduce the uncertainty of IT usage outcome. In terms of cloud service, trust belief is particularly important. The clients not only need to build up their belief that the cloud service is reliable, dependable, helpful and trustworthy to their business (Gupta et al. 2013), but also believe that the security issue of cloud service can be well addressed or controlled (Brender and Markov 2013). When SMEs have a stronger trust belief that cloud computing technologies and service vendors will behave appropriately, they are more likely to make the strategic decision of transforming toward cloud service. Therefore, we hypothesize that:

H1: SMEs' trust belief on cloud service has a positive impact on their strategic choice of cloud service.

Organizational determinants of trust belief

Entrepreneurship of organizations is reflects a proactive strategy in initiating innovative activities (Miller 1983; Slater and Narver 1995) Entrepreneurial organizations are distinguished from non-entrepreneurial ones by a series of interdependent characteristics, including proactiveness, competitive aggressiveness, risk taking, and innovativeness (Lumpkin and Dess 1996; Naman and Slevin 1993). An entrepreneurial organization's proactiveness may cause it to overestimate the possibility of positive outcomes; thereby trust becomes a default choice. Thus, we conjecture that entrepreneurship facilitates organizations to build trust belief in general toward cloud service. More specifically, risk taking makes them be easy to trust the market and cloud situation, whereas their innovativeness allows them to have the trust belief on the cloud artifacts and technologies.

Risk taking suggests that entrepreneurial organizations have a higher level of trust propensity. Risk-taking preference at the organizational level refers to organizations' propensity to engage in uncertain even risky projects and preference for bold rather cautious acts to achieve objectives (Lumpkin and Dess 1996). Such propensity allows the organization to recognize opportunities that may not be visible to others. Compared with non-entrepreneurial organizations, entrepreneurial organizations are more tolerant of the institutional environment. They are more likely to believe the structural assurance of IT innovations across situations and situation normality of using IT innovations, such as cloud service (McKnight et al. 2011). Organizations with more entrepreneurship are more likely to perceive that the institution setting for cloud service is secure and normal, thus have a higher institution-based trust of cloud service. Thus, we hypothesize that:

Innovativeness of entrepreneurial organizations represents a willingness to go beyond existing technologies or practices and reflects a firm's tendency to engage in and support new ideas, novelty, experimentation, and creative processes (Lumpkin and Dess 1996). As entrepreneurial organizations have an open mind about innovations, they tend to have a positive interpretation of technological innovations. Entrepreneurs' innovativeness facilitates the formation of trust beliefs about the attributes of innovative IT artifacts and the positive outcomes of using those technological innovations. Thus, we hypothesize that:

H2: SMEs' entrepreneurship has a positive impact on their formation of trust belief on cloud service.

Asset specificity is referred to the extent of the value of an organization's capital is idiosyncratic to the relationship with another organization (Son et al. 2005). The specific assets of relationship are important sources of value creation in inter-organizational exchanges (Williamson 1995). When the difference between the value of relationship specific assets investments used in their intended specialized use and that in alternative uses is large, the partner is locked into the relationship with the focal organization. Subramani (2004) categorizes asset specificity into two groups: business process specificity and domain knowledge specificity. Subramani and Venkatraman's (2003) empirical study of 211 supplier-retailer relationships suggests that suppliers' intangible relationship-specific assets investment significantly influence their governance strategy such as quasi integration and joint decision making. In the cloud service context, the specific asset of the vendor-client relationship is similarly important for the dynamics of value creation and value retention. The business processes and domain knowledge of SMEs vary across different industrial sections, which requests the cloud service vendors can provide specific and customized service. Service vendors would like to invest in this relationship specific asset to approve their service quality, lock-in current customers and attract more customers. Nevertheless, such asset specificity is helpful to build up SMEs' trust belief on cloud service. Thus, we hypothesize that:

H3: The asset specificity between SMEs and cloud service vendors has a positive impact on SMEs' formation of trust belief on the cloud service.

Environmental determinants of trust belief

The influences of external environment stem from two aspects, including the marketplace and the regulation situation. The attributes of cloud service market are influential on organizations' judgment. SMEs are concerned about the number of vendors as well as the system or service supports availability on the cloud market (Furieux and Wade 2011). **Vendor scarcity** refers to the degree to which reputable and qualified vendors are inadequate in the cloud service market, which shapes a low level of market maturity (Keogh and D'Arcy 1994). When customers are constrained in their vendor selection, the service quality may not be guaranteed or lowered (Ang and Cummings 1997). With the increasing number of service vendors, the industrial competition improves the service quality (Xin and Levina 2008). Benign competition makes perfection more perfect and enough competent vendors in the market facilitate benign competition. In regard of the cloud service in emerging economies is still new, SMEs still have limited knowledge or experience about this innovative service. Therefore, the presence of sufficient competent vendors can deliver a positive signal to SMEs and make them confident on the cloud service market. As such, SMEs are more likely to form a positive trust belief on cloud service and the strategic transformation. Conversely, vendor scarcity reduces SMEs confidence on the market, resulting in a weak trust belief on the cloud-driven service innovation. Thus, we hypothesize that:

H4: Vendor scarcity in the cloud service market has a negative impact on SMEs' formation of trust belief on cloud service.

Structure assurance refers to contextual conditions such as promises, contracts, regulations, and guarantees are in place (McKnight et al. 1998). In this study, structure assurance specifically refers to the presence of promises, contracts, regulations and guarantees for customers to use cloud service. The service vendors can make promises and have clarified constructs with their clients. The industrial regulators and governments can also make appropriate regulations, policies, rules, and laws to guarantee the service delivery to small business. Nevertheless, SMEs may have less knowledge and information on the cloud technologies and services, compared with the service vendors. Such asymmetry calls for appropriate structure assurance. Structure assurance helps to ease SMEs' concerns about uncertainties and risks by supplying protection mechanism. Prior research has shown that structure assurance such as regulations influences the trust beliefs on specific IT artifacts and services (McKnight et al. 2011). Accordingly, we argue that structure assurance which provides legal protection or guarantees for cloud service usage makes SMEs more confident and have stronger trust beliefs on cloud service. Thus, we hypothesize that:

H5: Structure assurance of cloud service has a positive impact on SMEs' formation of trust belief on cloud service.

Methodology

Measurement and data collection

Constructs and related measurement scales were adapted from prior literature. Some minor modifications were made to fit the context of this study. All items of organizational-environmental determinants were measured in a seven-point Likert scale. In particular, 4 items of entrepreneurship were adopted from Naman and Slevin (1993), Hult and Ketchen (2001); 4 items of asset specificity and 2 items of vendor scarcity were adapted from Ang and Straub (1998); 4 items of Structural assurance were adapted from McKnight et al. (2011). Trust belief (3 items adapted from Pavlou and Gefen (2004)) and strategic choice of cloud service (3 items adapted from Venkatesh et al. (2003)) were measured in a five-point Likert scale. This is an effective precaution approach to reduce the common method bias (Podsakoff et al. 2003). Additionally, two control variables, i.e. the perceived benefits and IT competence, were included.

Data were collected in China, therefore the definition of SMEs in this study adhered to the criteria of China's National Bureau of Statistics. The official agent classifies enterprise as a SME based on its number of employees and annual sales. The Chief executive officer (CEO) and Chief information officer (CIO) of SMEs were chosen as the key informants in this study, as they should be key participants in IT strategy decision process, especially in SMEs. Finally, 107 valid responses out of 795 SMEs were used for following data analysis.

Data analysis

Partial Least Squares (PLS) was used to analyze the data. PLS can simultaneously assess the measurement model and the structural model. Additionally, PLS has advantages in term of modeling latent constructs under the condition of non-normality and small to medium sample size (Chin et al. 2003). Thus, we selected PLS for data analysis.

Measurement model assessment

The analysis results of measurement model were listed in Table 1. The composite reliability for all the constructs are greater than 0.7, and AVE are greater than 0.5. The results indicate that all the variables in this study meet the condition for reliability (Fornell and Larcker 1981). The ranges of item loadings also illustrate the good convergent validity of all constructs (loading>.50). All square roots of AVE are greater than the correlation coefficient between the discussed construct and other constructs, showing good discriminant validity among the constructs (Fornell and Larcker 1981). Based on above analysis, the reliability and validity of the constructs are established.

Constructs	CR	AVE	Loading Range	ENT	ASS	VES	STA	TRB	PEB	ITC	SCT
ENT	0.807	0.515	0.627~0.832	0.717							
ASS	0.822	0.610	0.653~0.875	0.170	0.781						
VES	0.841	0.731	0.710~0.979	0.083	0.284	0.855					
STA	0.910	0.718	0.790~0.887	0.343	0.400	-0.084	0.847				
TRB	0.926	0.806	0.886~0.905	0.365	0.308	-0.180	0.513	0.898			
PEB	0.925	0.712	0.783~0.901	0.244	0.295	-0.067	0.561	0.367	0.844		
ITC	0.950	0.905	0.934~0.968	0.209	0.077	-0.120	0.069	0.177	-0.012	0.951	
SCT	0.936	0.829	0.892~0.929	0.381	0.16	-0.123	0.352	0.374	0.356	0.113	0.910

Note: a) ENT: entrepreneurship; ASS: asset specificity; VES: vendor scarcity; STA: Structural assurance; TRB: trust belief; PEB: perceived benefits; ITC:IT competence; SCT: strategic choice of cloud service transformation.
b) CR: composite reliability; AVE: Average variance extracted.
c) The bolded diagonal elements are the square roots of the AVE values.

Table 1. Reliability, convergent and discriminant validity assessment

Structural model assessment

As shown in Figure 2, results of structural model testing by PLS support all of our hypotheses at a significant level of $p < 0.05$. The organizational-environmental determinants explain 36% of variance of SMEs' trust belief formation on cloud service. Trust belief together with the key control variables explain 20% variance of SMEs' ultimate strategic choice of transforming toward cloud service.

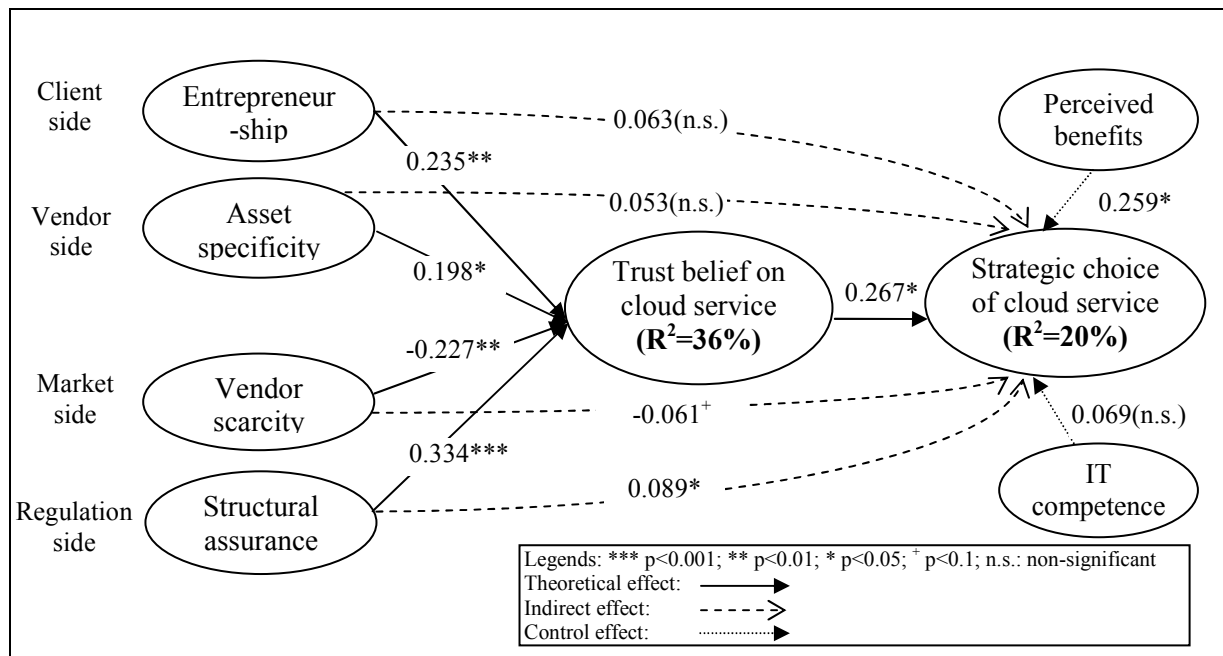


Figure 2. Results of model testing

As hypothesized, SMEs' trust belief has a significant direct effect on their transformation decision ($b=0.267$, $t=2.466$). The organizational determinants, including the small clients' entrepreneurship and the vendors' asset specificity for maintaining the relationship, are shown with significant effects on SMEs' trust belief formation in the magnitudes of 0.235 ($t=3.102$) and 0.198 ($t=2.453$), respectively. The clients' inherent character has a slightly stronger effect on such trust belief than the vendors' efforts. However, these organizational determinants have insignificant effect on SMEs' strategic choice of cloud service. The environmental determinants have strong effects on SMEs' trust belief on the innovative cloud service.

Vendor scarcity exerts a significantly negative effect on the trust belief formation ($\beta = -0.227$, $t = 2.75$), whereas the structural assurance stemmed from contacts, regulations and policies has a strong effect on SMEs' trust belief ($\beta = 0.334$, $t = 3.954$). These environmental factors from the cloud market and the regulation can also exert influences on SMEs' strategic decision. Overall, SMEs' building up the trust belief on cloud service plays an important mediating role in bridging the gap between the identified factors and SMEs' transformation toward cloud service. Our results conform the appropriateness of the trust based rationality for explaining SMEs' strategic choice of cloud service.

Implications

This study entails two important theoretical implications. First, differentiating from prior research cloud service acceptance that are based on the technical-economic rationality, this study propose the influential drivers that catch the trust-based rationality of organization. Our research model covers the specific factors of four aspects, including clients, service vendors, the cloud service market, and the regulative situation and empirically examines their effects on SMEs' trust belief formation and the sequent strategic choice. To best of our knowledge, this research develops a research model in a comprehensive view of organizational-environmental determinants for cloud service acceptance and meanwhile keeps the research model parsimonious, thus adding value to the IT acceptance and diffusion research in general and the cloud service research in particular.

Second, this study highlights the mediation effect of the trust belief formation that links the organizational-environmental determinants to SMEs' transformation toward cloud service. Further, we find that trust play different roles in the intervention process. On one hand, SMEs' inherent entrepreneurship and service vendors' specific asset investments on the relationship cannot directly drive SMEs' strategic choice, their effects must go through the formation of trust belief on cloud service. Therefore, the trust building process is embedded in the complex organizational decision and can fully mediate the effects of organizational drivers. On the other hand, the environmental determinants have indirect effects on SMEs' strategic choice, and the trust building only partially mediates the effects of vendor scarcity and structural assurance on SMEs' strategic choice. Regarding cloud service as an open system, it is reasonable that the maturity of the market and the regulative situation have stronger effects on SMEs' trust building and transformation decision. The results deepen our understanding of the mediating role of trust on organizational decision.

Practically, this study provides important insights for cloud service vendors in terms of offering effective services. Our empirical investigation sheds light on trust-based rationality of organizations. Therefore, service vendors should recognize the importance of providing reliable, dependable, trustworthy services. When the service targets SMEs, vendors should invest certain efforts in establishing and maintaining relationships with SMEs. Such asset specificity can bring more clients to vendors and lock-in the clients. Meanwhile, cloud service vendors should pay attention to environmental influences. Vendors should understand the market wave of technologies that will affect the clients' trust belief on the service. Accordingly, cloud service vendors should establish a win-win marketing strategy alliance with their existing users to attract potential clients. The cloud market regulators or government should provide more clear and reliable regulations, rules, and policies to break the information asymmetry between cloud service vendors and small clients and thus allow the small clients to have strong trust belief on the cloud technologies as well as the market regulation.

Conclusion

This study relies on the trust-based rationality of organizations and identifies the organizational-environmental determinants that influence SMEs' trust belief on the IT innovations and their strategic choice of transformation toward the new paradigm. The empirical data provides strong supports on our research model. We are also aware of limitations of this research that point to future work. For instance, the sample in China may limit the generalization of findings to other regions. Trust based rationality might be more suitable in the context of China. We can repeat our research in other regions to check whether the culture will be a contingency.

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