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Opportunities and risks of software-as-a-service: Findings from a survey of IT executives

Alexander Benlian *, Thomas Hess

Institute for Information Systems and New Media, University of Munich, Ludwigstr. 28, 80539 Munich, Germany

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ABSTRACT

IT providers have heralded software-as-a-service (SaaS) as an excellent complement to on-premises software addressing the shortcomings of previous on-demand software solutions such as application service provision (ASP). However, although some practitioners and academics emphasize the opportunities that SaaS offers companies, others already predict its decline due to the considerable risk involved in its deployment. Ours is the first study to analyze the opportunities and risks associated with adopting SaaS as perceived by IT executives at adopter and non-adopter firms. We first developed a research model grounded in an opportunity-risk framework, which is theoretically embedded in the theory of reasoned action. Subsequently, we analyzed the data collected through a survey of 349 IT executives at German companies. Our findings suggest that in respect to both SaaS adopters and non-adopters, security threats are the dominant factor influencing IT executives' overall risk perceptions. On the other hand, cost advantages are the strongest driver affecting IT executives' perceptions of SaaS opportunities. Furthermore, we find significant differences between adopters' and non-adopters' perceptions of specific SaaS risks and opportunities, such as performance and economic risks as well as quality improvements, and access to specialized resources. Our study provides relevant findings to improve companies' assessment of SaaS offerings. It also offers SaaS providers insights into the factors that should be prioritized or avoided when offering SaaS services to companies at different stages of their technology adoption lifecycle.

1. Introduction

On-demand software delivery service models have been developed since the late 1990s and have come in many forms and varieties, including application service provision (ASP) and business service provision (BSP). These types of demand-driven application services provide users and firms with Internet-based access to resources, expertise, and an integrated portfolio of complex applications spanning firms' complete virtual value chain [40,69]. In recent IS research and management literature, discussions of ASP-based outsourcing have been rather muted, mainly because there have been few breakthrough success stories. Instead, a novel on-demand software delivery model, called software-as-a-service (SaaS), has caught IT executives' and researchers' attention. SaaS generally refers to an on-demand software delivery service model [4,51], which is part of the cloud computing phenomenon. According to Youseff et al. [77], cloud computing can be conceived of as a stack of five layers that build on each other: cloud software applications (i.e., SaaS) are at the top of the stack; then the cloud software environment (also called the platform layer); the cloud software infrastructure (i.e., computational resources, storage, and communications); followed by the software kernel; and, finally, the hardware at the bottom. Each layer represents a level of abstraction that hides all the underlying components from the users, thus providing easy access to this layer's functionality and resources.

According to a study by Gartner, SaaS is predicted to become increasingly important in most enterprise application software (EAS) markets. Worldwide software revenues for SaaS delivery are forecasted to grow by 19.4% overall between 2008 and 2013 [52]. Practitioners and researchers see promising opportunities for the successful adoption of SaaS, especially in those application markets requiring low levels of system customization (e.g., Office suites) [54]. However, not everyone is positive about SaaS adoption. Some companies and market researchers are particularly skeptical about its viability and applicability in strong EAS markets such as ERP. The main adoption barriers are said to be reliability issues (i.e., stable access to services), information security and privacy concerns (i.e., security breaches and improper protection of firm data), and process dependence (i.e., performance measurement and service quality) [7].

Puzzled by these conflicting viewpoints, researchers and managers have struggled to establish SaaS's viability. Although there is a substantial body of research on the determinants and risks associated with traditional IT outsourcing and previous on-demand software models such as ASP (e.g., [19,39]), virtually no studies have been done on the opportunities and risks associated with SaaS-based software delivery arrangements. The existing findings on risk and opportunity assessments (e.g., [76]) are rather abstract in that there are no in-depth

* Corresponding author. Tel.: +49 89 2180 6390; fax: +49 89 2180 13541.
E-mail addresses: benlian@bwl.lmu.de (A. Benlian), thess@bwl.lmu.de (T. Hess).

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empirical analyses to ascertain which risk factors and potential opportunities associated with SaaS are most influential in forming firms' adoption decisions. An in-depth empirical analysis is, however, necessary to develop a deeper understanding of the nuances of key firm decision makers' perceptions regarding risk and opportunity in companies. In addition, existing assessments of risk and opportunity do not distinguish between SaaS adopters and non-adopters. Such a distinction seems to be especially relevant for SaaS providers' service offerings at different stages of the technology adoption lifecycle. In the light of the growing interest in the service paradigm, Rai et al. [60] note that "important questions emerge on customer perceptions and the economics of digitally enabled services." The authors thus suggest that "the economics and customer experiences [should be examined] with these services relative to traditional services" (p. 330).

Our study responds to this call for research and addresses the managerial problem mentioned above. In doing so, our study draws on an opportunity-risk framework – theoretically grounded in the theory of reasoned action (TRA) [1] – to examine IT executives' behavioral intention formation when assessing SaaS's opportunities and risks [30]. Exploring IT executives' decision-making at SaaS adopter and non-adopter firms may help us develop a better understanding of the perceptions of the opportunities and risks associated with digitally enabled services. In addition, this may help provide concrete answers, based on theoretical arguments, to managerial concerns [70]. By conceptually embedding an opportunity-risk framework into the TRA, our study also provides theoretical insights into how decision formation, sense-making activities, and the handling of uncertainty (i.e., opportunities and risks) in companies can be represented in a model of senior management's behavioral intentions [32,63]. To clearly delineate the scope of our study, we focus on software (or cloud) applications delivered as services over the Internet. We therefore explicitly exclude other (i.e., platform or infrastructure) services provided through the cloud. Our specific research questions are as follows:

- *RQ1:* IT executives' perception of opportunities' and risks' influence on the level of SaaS adoption
  a. What specific opportunities influence the level of SaaS adoption?
  b. What specific risks influence the level of SaaS adoption?
- *RQ2:* A comparison of adopters' and non-adopters' opportunity and risk assessments
  a. How do SaaS adopters and non-adopters compare regarding their opportunity assessments?
  b. How do SaaS adopters and non-adopters compare regarding their risk assessments?

This paper is structured as follows: First, we provide some background information on specific technical and economic characteristics of SaaS. Thereafter, we review the relevant literature on the opportunities and risks associated with traditional and on-demand software delivery models. Subsequently, we derive our research hypotheses on the basis of an opportunity-risk framework embedded in the theory of reasoned action. Next, we present our research methodology, which is followed by our empirical analysis results. The paper concludes with a discussion of our findings, the theoretical and practical contributions of our work, its shortcomings, and future research directions.

2. Background and related literature

2.1. Economic and technical characteristics of SaaS

The SaaS model evolved from the application service provisioning (ASP) model, which emerged in the late 1990s as an on-demand software delivery option for (on-premise) commercial off-the-shelf application development. The ASP model involved vendor hosting, as well as managing and delivering application capabilities remotely from a data center accessed via the Internet [62,65,69]. Technical issues that held ASP back during the 1990s included the initial design problems (i.e., few software applications were designed to be remotely accessible at that time), limited bandwidth availability, and slow Internet speeds. These problems made ASP a very expensive and impractical solution during that time [41]. Software vendors' reluctance to fully push this new software delivery model due to its economic disadvantages also hindered ASP's progress greatly. Since the early ASP model was based on a single-tenant architecture, software vendors could not share IT infrastructure and application code efficiently across their customers, which created low economies of scale.

Responding to the ASP model's technical limitations and economic shortcomings, SaaS emerged as an advanced way to provide software services. In SaaS's new multi-tenant architecture, there is only a single instance of the common code and data definitions of a given application on the vendor's server. This code cannot be customized [76]. Customer-specific configurations can only be made at the meta-data layer on top of the common code by using the interfaces that the SaaS vendor provides [14]. This new architecture has important implications for customer perceptions of opportunities and risks. First, unlike in the classical ASP model in which the software applications and IT infrastructure are dedicated to each customer, the applications and infrastructure are shared across customers in the SaaS model. Second, the SaaS model constrains clients' customization options of the software's main functionality and data structures. Third, it provides the vendor with more control over future development: The clients have to acquire future software upgrades, because the interfaces are usually not backward compatible. Thus, this model no longer requires the vendor to make any client-specific investments [76]. In addition, it helps vendors create significant economies of scale, because they do not need to constantly increase the size of their data centers. This, in turn, may have implications for the provider regarding the system performance and availability, data security and privacy, and cost efficiency, but also for the customer regarding opportunity and risk assessment.

Given that SaaS can be construed as a special form of on-demand outsourcing (because SaaS customers source software applications externally from SaaS vendors), prior studies on IT outsourcing and ASP may provide useful perspectives on the opportunity and risk assessment associated with software applications' external delivery.

2.2. Related literature on opportunity-risk assessments in traditional IT outsourcing and ASP research

Since the start of IT outsourcing (ITO) activities in the early 1990s, there has been sufficient evidence of the outsourcing question's complexity. This complexity involves both *opportunities* and *risks* that need to be weighed to optimize outsourcing outcomes [17,26]. In the early stages of ITO research, the identification and description of opportunities and risks associated with an ITO decisions were the primary focus. Earl [19], for example, identifies 11 risks associated with outsourcing IS services. These risks range from the organizational (e.g., a lack of organizational learning), technical and operational (e.g., the endemic uncertainty of IS operations and IT/IS development or indivisibility), to the economic (e.g., the "hidden costs" of outsourcing) and strategic (e.g., the risks associated with a change in business strategy, excessive dependence, and lock-in). Lacity and Hirschheim [44] investigate several outsourcing risks, using an empirical analysis of companies' ITO decisions. These risks include a potential lack of business understanding and vendor skills, as well as loss of control and deteriorating service levels over time [44]. Research on what motivates client organizations to outsource IS, in general, and on application development and maintenance, in particular, has revealed a long list. This list of related motivations and expectations includes cost savings, access to expertise and skills, focusing internal resources on more strategic work, improving business/process performance, and increasing flexibility [17,26,39]. More recent literature reviews have shifted

attention toward assessing the relative importance of ITO and ASP's opportunities and risks (see Table 1).

Gonzalez et al. [27], for example, identify an increased focus on strategic issues and increased IS flexibility and quality as the main reasons for client companies engaging in ITO. On the other hand, low (uncertain, or uneven) provider staff qualifications and the loss of critical skills and competencies are among the most relevant ITO risks identified [27]. Similarly, in an empirical study of banking firms, Gewald and Dibbern [24] find that the focus on core competencies and quality improvements is the strongest opportunity factor. On the other hand, financial and strategic risks are the predominant risk factors affecting the intention to increase or decrease the level of outsourcing.

With the advent and advancement of on-demand software delivery models, research studies have also examined the relative importance of the opportunities and risks associated with ASP. For example, Günther et al.'s [29] survey of ASP customers shows that quality improvements, a focus on core competencies, and access to cutting-edge software are the most important ASP advantages and benefits. Data security, the vendor's financial stability, and performance risks are among the most important risks. Currie et al. [13] find that a focus on core activities, service quality improvements, and cost savings is the most important key performance indicator as it addresses major opportunities reported by ASP customers. In terms of risks, ASP customers considered data security, disaster recovery, vendor financial stability, and application availability the most important risks associated with ASP.

Overall, a considerable body of knowledge examining the risks and opportunities associated with traditional ITO and on-demand software models has accumulated over the last two decades. However, although the initial studies have explored factors affecting SaaS adoption, including the technical, process, and economic factors [7,76], and have investigated optimal contractual designs in SaaS-based relationships [66], there is still little empirical research on the opportunities and risks of SaaS adoption. Owing to the paucity of research in this area, this study's primary goal is to gain a deeper understanding of the opportunities and risks of SaaS adoption through key IT decision-makers' perceptions. In addition, because the diffusion of SaaS is still in its infancy, it is important to understand the similarities and differences between opportunity and risk assessments before and after SaaS adoption. Thus, our study will also focus on comparing the perceptions of IT executives at SaaS adopter and non-adopter firms.

Table 1
Related Literature in Traditional IT/BP and On-demand Outsourcing Research Examining the Relative Importance of Opportunities and Risks.

Area of research	Study (method)	Opportunities		Risks	
		Focus and scope of study	Key results	Focus and scope of study	Key results
(IT outsourcing (ITO)/ business process outsourcing (BPO)	Loh et al. [49] (survey)	Compares technical and business benefits of ITO	Business benefits are comparatively stronger in explaining (average) degree of outsourcing and ratio of outsourcing expenditures	Compares control and opportunism risks of ITO	Control risks are comparatively stronger in explaining the (average) degree of outsourcing and the (average) change in outsourcing
	Gonzalez et al. [27] (survey)	Ranks 10 ITO reasons	Most relevant reasons for ITO from an outsourcer company's perspective are focus on strategic issues, increased IS department flexibility, improved IS quality, elimination of troublesome everyday problems, and increased access to technology	Ranks 11 ITO risks	Most relevant ITO risks from an outsourcer's perspective are low provider staff qualifications, uncertain provider compliance with the contract, dependence on the provider, loss of critical skills and competencies, and inability to adapt to new technologies
	Lacity et al. [47] (meta-analysis)	Presents 17 different motivations for ITO	The most frequently cited motivations for IT outsourcing are cost savings, focus on core capabilities, access to expertise/skills, performance/quality improvements, technical reasons, strategic flexibility	Enlists 28 most common ITO risks	The study provides an overview of the 28 most common ITO risks, such as hidden costs, loss of in-house capability, loss of data, and security/ privacy breaches
	Gewald et al. [24,25] (survey)	Investigates 4 major benefits of BPO, including cost advantages, focus on core competencies, access to specialized resources, and quality improvements	Most dominant BPO benefits from an IT manager perspective are focus on core competencies and quality improvements, while access to specialized resources does not have a significant impact	Investigates 4 major BPO risks, including performance, financial, strategic and psychosocial risks	Financial and strategic risks are the most dominant risk factors, while psychosocial risk is not significant
Application Service Provision (ASP)	Günther et al. [29] (survey)	Investigates the perceived importance of 6 major benefits of ASP	Quality improvements, focus on core competencies, and access to cutting-edge software are the most important ASP advantages/benefits	Investigates the perceived importance of 6 major ASP risks	Data security, financial stability, and performance risks are among the most important ASP risks
	Kern et al. [40] (survey and case studies)	Assesses 8 major business benefits of ASP	Key business/technical ASP benefits include focus on core activities, significant cost savings, enhanced business flexibility, access to skills, applications, and services not otherwise available	Assesses 15 major ASP risks	Incomplete contracting, supplier bankruptcy, application unavailability, security breaches, and slow response times are among the highest ASP risks
	Jayatilaka et al. [35] (survey)	Studies 15 criteria for the ASP vs. in-house choice	Key criteria addressing ASP benefits or opportunities are potential cost advantages and access to qualified IT staff and support	Studies 15 criteria for the ASP vs. in-house choice	Key criteria addressing ASP risks are ASP vendor characteristics (e.g., financial viability), data security, and compatibility
	Currie et al. [13] (survey)	Evaluates the importance of 38 KPIs in relation to ASP customers' business requirements	Focus on core activities, service quality improvements, and cost savings are the most important key performance indicators addressing major opportunities reported by ASP customers	Evaluates the importance of 38 KPIs in relation to ASP customers' business requirements	Data security, integrity and migration, disaster recovery, financial stability of vendor, and application availability are the most important key performance indicators addressing major risks reported by ASP customers

3. Theoretical perspective and hypotheses development

3.1. Theory of reasoned action as theoretical foundation of opportunity-risk assessments

Previous studies examining the opportunities and risks associated with ITO have mainly drawn on different economic and organization theories to explain why firms choose to outsource or refrain from it. These theories include transaction cost theory (e.g., [75]), the resource dependency theory (e.g., [55]), agency theory (e.g., [36]), the resource-based theory (e.g., [28]), institutional theory (e.g., [18]), and organization (e.g., [15]) and social exchange theory (e.g., [20]).[1] These theories have mainly contributed to our understanding of outsourcing *outcomes*. However, only a few research studies drawing on these theories have focused on the decision *process* itself (e.g., [16]) and, thus, on how decision-makers arrive at outsourcing decisions by weighing critical evaluation criteria prior to an outsourcing decision. Owing to their main emphasis on the organizational level of analysis, economic and organization theories have rarely addressed the (cognitive) processes that influence individuals' behavior (i.e., key decision-makers in firms). These theories have therefore treated decision-making as a "black box."

However, there is agreement in the research literature that the adoption of ITO practices is a major management decision made by individuals rather than organizations. For example, empirical studies have indicated that the final decision regarding the sourcing of IT functions is solely made by top IT executives in an organization [3]. In addition, the outsourcing decision process is mostly initiated by either the top management or IT management [74]. These empirical findings indicate that ITO decisions are under the control of IT executives, who can be considered the primary decision-makers [33]. Researchers have therefore drawn on conceptual (stage) models that match the decision-making process that senior managers undergo when cognitively evaluating their sourcing options and subsequent outcomes [17,61]. In these frameworks' first stage, which corresponds to Simon's intelligence phase [61] and is consistent with decision theory's risk-benefit concept [34,50,68], IT executives weigh the advantages and disadvantages of ITO to determine their risks and benefits. This method of balancing opportunities and risks can be understood and framed as reasoned action based on a mental representation of future outcome scenarios' evaluation. The method thus explicitly mirrors the use of cognitive processes when forming decision intentions [1,63].

In this regard, the theory of reasoned action (TRA) is a well-researched intention model that suggests that an individual's decision to engage in a specified behavior is determined by this person's intention to perform this behavior. In turn, this intention is jointly determined by a person's attitude toward the behavior (the person's salient behavioral beliefs) and the subjective norm governing the behavior (the person's normative beliefs and motivation to comply with these beliefs) [1,22]. While the TRA was originally developed in social psychology to examine human beings' behavioral intentions without assuming an organizational context, a few IS studies have used the TRA to study organizational decision makers (e.g., [30]). Since the TRA describes an active, deliberate decision process that occurs within the constraints of social expectations and limited resources, it is a useful and appropriate theoretical lens for studying IT executives' mental assessments of opportunities and risks.

Drawing on the TRA's main line of reasoning[2] [1,22], we argue that IT executives' intention to adopt SaaS depends on their attitude toward SaaS adoption, which is influenced by salient behavioral beliefs in this regard. More specifically, we suggest that weighing SaaS's opportunities and risks is one way to model and represent salient (positive and negative) beliefs as determinants of attitudes, as well as of subsequent behavioral intentions and actions. Accordingly, positive beliefs about SaaS adoption increase the perceived opportunities, whereas negative beliefs result in perceived risks [37]. Based on this notion, we argue that IT executives assess specific risks and opportunities[3] that may arise from SaaS adoption, thereafter combining them into overall perceived risks and overall perceived opportunities. The result is an overall attitudinal appraisal of SaaS adoption, which influences IT executives' SaaS adoption intentions.

Since the TRA can be applied to a wide range of behaviors, the nature of the beliefs that influence a particular behavior is left unspecified. In a mature field of study in which the beliefs that underlie a focal behavior are well specified, the prior literature is usually sufficient to explain the forming of relevant beliefs [23]. When deriving our hypotheses in the following sections, we will therefore draw on validated concepts and theories used in the extant literature to explain the forming of salient behavioral beliefs that determine attitudes and subsequent actions [22].

3.2. Opportunity-risk model of SaaS adoption

The TRA asserts that attitudes toward behavior are generally accurate predictors of individual behavioral intentions. Recently, studies using the TRA in contexts related to IT adoption and IT outsourcing intentions have indicated that attitudes are important for understanding and predicting behavioral intentions (e.g., [30]). Applying the TRA to the SaaS adoption context, this study hypothesizes that SaaS adoption intentions will be determined by IT executives' overall attitudinal appraisal of the perceived risks and perceived opportunities associated with SaaS adoption. Perceived risks' influential role in IT adoption processes in general and in IT outsourcing decisions in particular is widely supported at the individual and organizational level in different application contexts. For example, perceived risk has been shown to influence users' intention to adopt Internet-based applications and services (e.g., bill payment services) at the individual consumer level [21,42]. At the organizational level, perceived risk has been found to negatively affect IT managers' intention to increase the level of business process outsourcing (BPO) [24,25]. Likewise, IT adoption's perceived benefits have been shown to influence IT executives' intention to adopt (or increase the degree of adoption of) ITO/BPO. For example, in an empirical study in the German banking industry, Gewald [24] showed that perceived opportunities in BPO strongly affect IT managers' intention to increase adoption levels. Along the same lines, Chwelos et al. [11] found that the perceived benefits of electronic data interchange (EDI) have a significant influence on IT managers' EDI adoption intentions. Based on the theoretical underpinnings and empirical evidence presented above, we thus expect that IT executives' perceived risks and opportunities will also play a significant role in the forming of SaaS adoption intentions. Since one of our central research questions distinguishes between SaaS adopters and non-adopters, we focus our analysis on the *variation in their levels of intention to increase current* SaaS adoption rather than seeking to *explain the variation in the current degree* of SaaS adoption. Accordingly, we hypothesize that

Hypothesis 1. IT executives' perceived risks of SaaS adoption are negatively related to their intention to increase the level of SaaS adoption.

Hypothesis 2. IT executives' perceived opportunities of SaaS adoption are positively related to their intention to increase the level of SaaS adoption.

[1] See Dibbern et al. [17], Gonzalez et al. [26], Lacity et al. [47] and Alsudairi and Dwivedi [2] for comprehensive literature analyses of IS outsourcing studies in IS research and the theoretical lenses used to study IS outsourcing.

[2] Here, we refer to the belief-attitude-intention relationship. Since we focus on the forming of an IT executive's attitude through salient behavioral beliefs, we neglect the influence of subjective norms (and normative beliefs) on the forming of behavioral intentions.

[3] The authors consciously prefer the terms "opportunities" and "risks" rather than "benefits" and "costs" because the subject of this study is better described by these terms.

The resulting basic opportunity-risk model for SaaS adoption, which is conceptually embedded in the TRA, is shown in Fig. 1. This model is the basis for further hypothesis development regarding IT executives' salient opportunity and risk beliefs' influence on the overall risk and opportunity perceptions.

3.3. Salient risk beliefs in SaaS adoption

We use the perceived risk framework developed by Cunningham (1967) to derive hypotheses on individual risk factors' influence on the overall perceived risk [12]. In this regard, perceived risk is commonly thought of as the felt uncertainty regarding the possible negative consequences of adopting a product or service. Thus perceived risk is relevant to the forming of salient risk beliefs in the TRA model. Perceived risk has formally been defined as "the expectation of losses associated with purchase and acts as an inhibitor to purchase behavior" [53]. It is relevant in decision-making when the circumstances of the decision create uncertainty, discomfort and/or anxiety, and conflict in the decision maker [8]. On the basis of these definitions, we define perceived risk as "the potential for loss in the pursuit of a desired outcome when sourcing software as a service."

Cunningham (1967) typifies perceived risk as having six dimensions: (1) performance, (2) economic/financial considerations, (3) opportunity/time, (4) safety, (5) social factors, and (6) psychological factors [12]. A rich stream of consumer and organizational behavior literature supports the use of these risk factors in understanding product and service evaluation on the individual and organizational levels (e.g., [21,42]). When transferring this framework to the SaaS context, we reduced it to five factors, using the following terms: performance, economic, strategic, security, and managerial/psychosocial risk factors. These factors are the most frequently reported types of risk that the extant literature associates with SaaS adoption (e.g., [7,19,40]). These risks may therefore be linked to salient beliefs affecting the forming of IT executives' attitudes and decision intentions [63]. Below, we provide further details of these five types of SaaS adoption risks and derive hypotheses on IT executives' perception of their relationship to overall risk appraisal (i.e., perceived risk of SaaS adoption).

Performance risks are the possibility that SaaS may not deliver the expected level of service. That is, SaaS does not provide application availability and/or network bandwidth as the provider originally stipulated [24]. System outages and connectivity problems can affect all customers at once, which implies a high value at risk [38]. In addition, performance risks include the risk of problems related to the SaaS application's interoperability with homegrown applications located on the client side. Potential losses due to performance risks can be significant because the day-to-day operations will not be optimally supported. Such a lack of support leads to organizational inefficiency, or even to severe damage to the organization's reputation if customer-oriented processes are affected. Potential sources of failure are the inability to provide agreed-upon resources, a lack of vendor capabilities, and poor service level agreement (SLA) management [24]. Given performance risks' relevance for SaaS adoption and usage, we suggest that they are a salient IT executive belief, one which affects SaaS adoption's overall perceived risk.

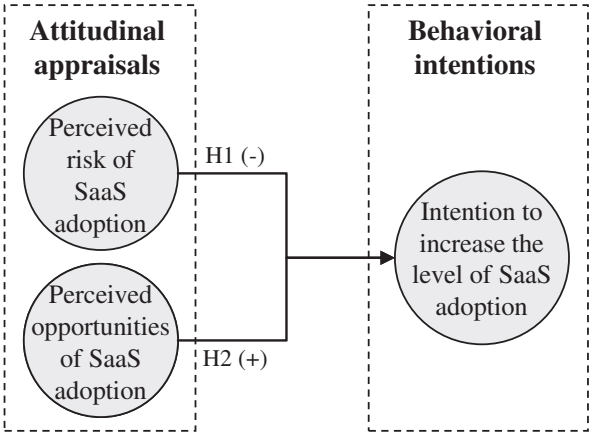

Fig. 1. Opportunity-risk model of SaaS adoption.

Hypothesis 3. IT executives' beliefs regarding the performance risks of SaaS adoption are positively related to its overall perceived risks.

Economic risks indicate that a SaaS client may have to pay more to reach the expected level of service than initially anticipated — the so-called "hidden costs" [6]. SaaS's architectural approach shifts specific investments to the client. The vendor, for example, does not customize the common code or data definitions on its servers, and the client is responsible for maintaining all the customized components [76]. Thus, if the client wants to customize the application core, he needs to own it. Even if the client can use the standard core, he may want to build components on top of the core functionality (using APIs) to suit his needs with regard to integration and customization. Higher-than-expected costs may thus arise from the additional or changing future requirements. In addition, increasing costs may emerge from the hold-up, because vendor ownership of the application core provides the vendor with more future bargaining power. This power enables him to increase prices, charge extra costs, or refuse to invest in backward-compatible interfaces for the client's customized code [76]. Given the pertinence of economic risks to SaaS adoption, we propose that perceived economic risks will be a relevant salient IT executive belief that affects SaaS adoption's overall risks.

Hypothesis 4. IT executives' beliefs regarding SaaS adoption's economic risks are positively related to its overall perceived risks.

Strategic risks are the risks that a company will lose critical resources and capabilities when sourcing applications via SaaS [39]. This specifically holds if business-critical applications and those that support a broad spectrum of key functional areas within an organization, including ERP, SCM or CRM systems, are outsourced. The external sourcing of these essential resources can result in a high level of interdependence between the client and the vendor firm [41,67]. In the same vein, SaaS adoption may reduce a company's ability to react swiftly to new internal forces (e.g., by aligning itself with new business strategies) and external forces (e.g., by seizing new market opportunities). The reduced ability could be due to the SaaS provider having full control over the application development and maintenance. In anticipation of such potential resource dependence, we argue that IT executives' perceptions of the strategic risk associated with SaaS adoption are relevant salient beliefs that influence the overall perceptions of the risk associated with SaaS adoption.

Hypothesis 5. IT executives' beliefs regarding SaaS adoption's strategic risks are positively related to its overall perceived risks.

When a client uses SaaS, some, or even all, of that client's data will be stored at the SaaS provider's data center. SaaS clients give a provider direct control of their data (and, thus, of valuable assets [37]) without knowing exactly how this provider will secure the data and which backup and disaster recovery procedures he has in place. Service-level agreements can be used to indicate the exact data security levels that should be maintained. Nevertheless, client experience in sourcing software via a service provider is often slight. Moreover, technological developments advance so swiftly, that clients are mostly unaware of the potential security risks arising from contractual flexibility when they sign service contracts [31]. Ambiguities and loopholes in the contract may prompt opportunistic behavior on the part of the vendor [73]. Furthermore, the nature of Internet-based technologies and environmental uncertainties is still unpredictable. The prospect of security

breaches, such as data theft or corruption, may therefore cause anxiety and discomfort in potential and actual SaaS customers [41]. Given that IT executives anticipate the possibility of security risks, we propose that perceived *security risks* form a crucial salient belief affecting the overall perceived risk.

Hypothesis 6. IT executives' beliefs regarding SaaS adoption's security risks are positively related to its overall perceived risks.

In addition to influencing perceived risk on the firm level, outsourcing may also affect the personal affairs of the managers responsible for the application's outsourcing. *Managerial risks*, which previous studies have also termed psychosocial risks [24], are the possibility that the personal reputation and career of the manager responsible for the application will be harmed if the software is sourced to an external service provider. The media often associate outsourcing ventures with negative events, such as job loss and failed outsourcing deals. This may affect how managers are perceived by their peers, clients, and staff, which may lead to a loss of power due to a loss of control over resources [27]. By assuming that IT executives may be aware of the negative personal consequences that could result from SaaS adoption, we argue that perceptions regarding managerial risks are an underlying salient IT executive belief that influences SaaS adoption's overall perceived risk.

Hypothesis 7. IT executives' beliefs regarding SaaS adoption's managerial risks are positively related to its overall perceived risks.

3.4. Salient opportunity beliefs in SaaS adoption

On the basis of studies in the ITO and ASP literature, we included five major opportunities of SaaS adoption in our research model. These opportunities have been repeatedly identified as the most important motivations for outsourcing: *cost advantages, strategic flexibility, a focus on core competencies, access to specialized resources, and quality improvements* [47]. Below, we describe the five opportunity dimensions in the context of SaaS adoption. We also posit hypotheses on their relationship to IT executives' attitudinal appraisals of the overall opportunities associated with SaaS adoption.

Cost savings are the most common and consistent motives that researchers have identified for IT outsourcing over time [16]. Cost advantages indicate that external vendors can provide IT functions, such as application services, at lower costs than client companies can. This ability is due to such vendors' specialization and realization of economies of scale and scope. In the SaaS business model, the ownership, development, and maintenance of software applications (and the entire software stack) remain in the vendor's hands. Unlike with an on-premises model, the software is not downloaded and installed on the user's computer. Consequently, software vendors have full control of their software applications and the underlying infrastructure. Since the SaaS business model runs a shared infrastructure and provides multiple users with a single instance of a highly standardized software service, it can be based on an extremely scalable and cost-efficient platform. These improved economics in the provision of SaaS-based applications can be passed on to customers, who may benefit from the lower total ownership costs. In addition, unlike with traditional on-premises software that users purchase through a perpetual-use license, SaaS users buy a subscription from the SaaS provider. Therefore, SaaS does not require a large upfront investment. This approach affects the buyer's cash flows, with small, stable cash flows occurring rather than large periodic payments for licenses, maintenance contracts, and upgrades [10]. Given that IT executives expect these potential cost advantages from SaaS adoption, we suggest that the perceived cost advantages of SaaS adoption will affect the overall perceived opportunities associated with SaaS adoption.

Hypothesis 8. IT executives' beliefs regarding SaaS adoption's cost advantages are positively related to its overall perceived opportunities.

Strategic flexibility assumes that SaaS clients are more flexible regarding switching IT providers than traditional on-premise installations. This flexibility is due to on-demand application delivery, capital, and operational investments being shifted from the customer to the SaaS provider [46]. In this way, the SaaS model considerably reduces the vendor lock-in effects due to the high switching costs prevalent in the provision of on-premises software [72]. In addition, SaaS adoption provides a great degree of flexibility regarding the utilization of easily scalable IT resources. This flexibility makes it easier for firms to respond to business-level volatility, because the SaaS provider handles fluctuations in IT workloads. In this regard, a client company can leverage a SaaS vendor's capacity to adapt to change. Given this anticipated greater strategic flexibility, we expect that IT executives' perceptions of strategic flexibility will create a relevant salient belief affecting their overall perceptions regarding the opportunities associated with SaaS adoption.

Hypothesis 9. IT executives' beliefs regarding the strategic flexibility available through SaaS adoption are positively related to its overall perceived opportunities.

In the IT outsourcing literature, those empirical studies that have based their theoretical arguments on the resource-based view have found that outsourcing enables firms to *focus on their core businesses* because they can free up resources, which can be used more productively in areas that create value (e.g., [48,67]). Refocusing on core competencies was later confirmed as the main driver of ASP adoption [35]. We argue that SaaS adoption will also facilitate firms' refocusing on their core competences. This refocusing is possible by completely shifting responsibility for developing, testing, and maintaining the outsourced software application and the underlying infrastructure to the vendor. This shift will not only relieve line managers of the task of coordinating a large IS department, but will also eliminate IT staff members' routine support activities [27]. The staff can then dedicate their time to more strategic IS activities to determine how the company's IT can add value to the business. Since IT executives may anticipate this opportunity, we expect that their perceptions regarding their companies' ability to focus on core competencies through SaaS will be a salient belief influencing their overall perceived opportunities through SaaS adoption.

Hypothesis 10. IT executives' beliefs regarding their firms' ability to focus on core competencies through SaaS adoption are positively related to its overall perceived opportunities.

Access to leading-edge IT resources has been shown to be one of the main indicators of ITO success and an important driver of outsourcing decisions [27]. Since the SaaS business model is based on a multi-tenant platform architecture, the vendor benefits from economies of scale by consolidating and virtualizing its data centers. Furthermore, the vendor also benefits from learning curve effects when professionalizing the delivery of software services via the Internet. As a result of sourcing software from an external service provider, SaaS clients benefit from economies of skills by leveraging the skills, resources, and capabilities that the service provider offers. These specialized capabilities (e.g., access to the latest technologies and IT-related know-how) could not be generated internally if the application were delivered in-house via an on-premises model [40]. As providing application services requires an extensive skill set, it can be argued that firms benefit from sourcing complex IS activities (i.e., those that require a well-developed and specific skill set) via the market, rather than providing them in-house [58]. Given the salience of this outsourcing opportunity, we argue that IT executives' perceptions of their firms' access to specialized resources through SaaS adoption constitute a salient belief that affects their overall perceptions regarding SaaS adoption's opportunities.

Hypothesis 11. IT executives' beliefs regarding their firms' access to specialized resources through SaaS adoption are positively related to its overall perceived opportunities.

Finally, *quality improvements* are also a frequently cited reason why firms choose to outsource their applications [47]. It is believed that there may be an increase in the efficiency and effectiveness of the processes that the application services support [45]. Empirical studies investigating the adoption of the ASP model have found that improved operational excellence is a main driver of this adoption [35]. This finding is based on an ASP's ability to focus its capacities exclusively on providing application services according to a pre-specified service level. Companies may also expect a SaaS provider to incorporate industry best practices and total quality management procedures such as lean management concepts for data centers because SaaS providers are expected to be more responsive to customer needs, or risk losing subscription revenues due to customers' lower switching costs [72]. In addition, SaaS-based business relationships between providers and customers, which are commonly based on key performance indicators (such as end-user response time or net uptime), allow an increased (outcome) measurability of service quality and clear contractual specifications regarding adequate service levels (e.g., with explicit provisions, which include fines, penalties, and even contract termination). These characteristics in turn allow for higher transparency than that of an on-premises solution and may translate into stronger vendor discipline and better service quality. Accordingly, we suggest that IT executives' perceptions regarding these potential quality improvements constitute a salient belief that will affect the overall perceived opportunities associated with SaaS adoption.

Hypothesis 12. IT executives' perceptions regarding quality improvements through SaaS adoption are positively related to its overall perceived opportunities.

Fig. 2 summarizes the hypotheses development and illustrates our final opportunity-risk model of SaaS adoption.

4. Empirical methods

4.1. Survey administration and sample characteristics

To test the research model in Fig. 2 and the associated hypotheses suggested above, a survey instrument was created to collect empirical data. The survey was distributed to an unstratified random sample of 2000 German companies. The sample was drawn with SPSS Statistics (version 17.0) from the Hoppenstedt database (http://www.hoppenstedt.de). Hoppenstedt is one of the largest commercial business data providers in Germany. The database contains over 300,000 profiles of German companies, their branches, and the major industrial associations in Germany. To bolster the external validity of our study, we did not constrain the sample to specific industries or to firms of a specific size. We thus drew a random sample from the entire population of company profiles in the Hoppenstedt database. The survey questionnaire was mailed to the most senior IT executive at each firm (e.g., the chief information officer [CIO] or the vice president in charge of IS), along with a letter outlining the purpose of the research and soliciting the person's participation. Postage-paid return envelopes were also included.

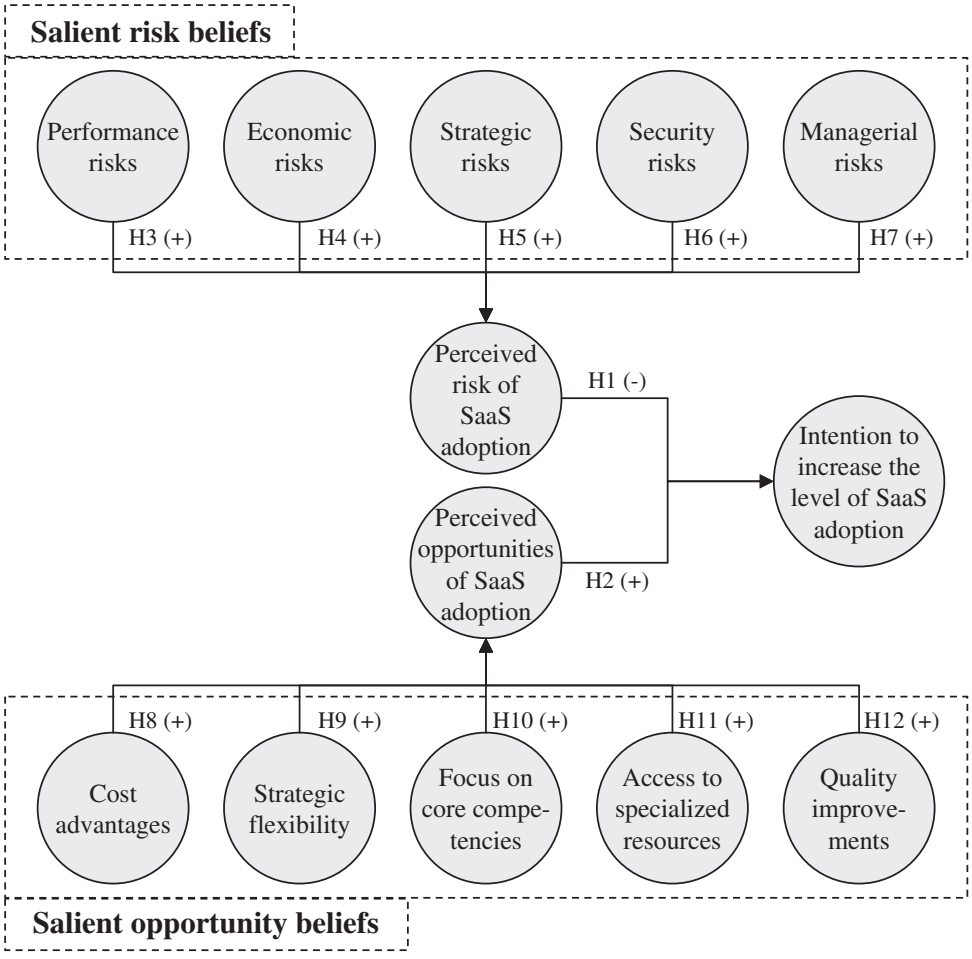

Fig. 2. Opportunity-risk model of SaaS adoption (complete).

The current study utilized a "key informants" methodology for data collection that has been a popular approach in empirical IS studies [56]. In organizational survey research, targeted respondents assume the role of key informants and provide information on a particular unit of analysis by reporting on group or organization properties. However, if a respondent lacks appropriate knowledge, the results can be confounding and may lead to erroneous conclusions. Therefore, within the context of this study, it was important to identify respondents who were involved with and most knowledgeable about SaaS. Consequently, in the introduction to our survey, we used a clear definition of SaaS and clarified its relationships with traditional ITO, ASP, and cloud computing. We also indicated that the survey had to be filled out by the most senior IT executive with a good overview of the organization's stance on SaaS. Moreover, to increase the content validity of the responses and avoid social desirability bias, we asked the respondents to fill out the questionnaire with reference to one specific SaaS application type (e.g., ERP or CRM) that they used or were familiar with, and not a typical or very successful one. To foster participation and reduce self-reporting bias, all the participants were given the opportunity to receive a report on how their firm position compared to that of firms of similar size and in similar industries. Finally, a pretest helped us develop both the content and the format of the specific questions in the survey. The evaluators included ten practitioners from various industries who were familiar with our research topic. We also included three academics who were experts in ITO research.

After 27 responses were discarded due to missing data, a total of 349 usable responses from 142 SaaS adopter companies and 207 non-adopter companies were available for data analysis. This resulted in a survey response rate of 17.5%. The total sample included firms from the following industries: manufacturing (29%); wholesale and retail trade (25%); financial intermediation (15%); telecommunications, information, media and entertainment (TIME) (11%); construction and real estate (9%); logistics (5%); public and healthcare (4%); and electricity/gas/water supply (2%). The additional sample characteristics of the total sample, as well as the sub-samples of adopters and non-adopters are shown in Table 2.

Based on the sample descriptives shown in Table 2, no significant differences ($p > 0.31$) emerged between SaaS adopters and non-adopters in terms of industry breakdown and firm size. Although preliminary steps were taken to ensure the appropriate selection of key informants, a formal check was administered as part of the questionnaire [43]. In respect to SaaS adopter firms, two items were used to assess IT executives' length of SaaS use (i.e., the number of months they had been using SaaS applications thus far) and the frequency of use (i.e., the number of times they on average logged into and used SaaS applications per month). The mean score for the length of SaaS usage was 21.22 months, and the main score for the frequency of usage was 17.34 times (or sessions) per month.

To verify SaaS non-adopters' experience with and knowledge of SaaS, we analyzed both their familiarity with SaaS and the extent to which they were considering (or not considering) acquiring SaaS in the (near) future. A total of 82.6% of the non-adopters indicated that they had been familiar with SaaS for more than 2 years (see Table 2). Furthermore, two-thirds of the non-adopters stated that they planned to seriously evaluate SaaS in the near future, or were already in the process of evaluating SaaS, whereas only 1.4% of non-adopters had not yet considered adopting SaaS. From these results, we confidently inferred that the responses of IT executives of SaaS non-adopters offered an informed perspective on the assessment of SaaS opportunities and risks.

4.2. Measures

Table 3 provides our conceptual definition of the constructs and a summary of the sources from which the items for the scales were drawn. All questions were answered using a Likert scale ranging from 1 to 5, with 1 referring to the lowest score (i.e., completely disagree) and 5 to the highest score (i.e., completely agree) on the item scale.

5. Statistical analyses and results

5.1. Assessing the measurement models

Content and face validity were established by adopting validated measurement items from previous research studies with minor changes in wording. The measurement models were validated using the standard procedures in the current literature [64]. Items from scales in a related domain were pooled and factor-analyzed to assess their convergent and discriminant validity. Whereas convergent validity was determined at both the individual indicator level and the specific construct level, discriminant validity was assessed by analyzing the cross-loadings, the average variance extracted, and the inter-construct correlations (see Table 4).

Table 2
Sample characteristics.

Category	Percent		Category	Percent	Category	Percent
	Adopters	Non-adopters		Total sample		Non-adopters
Number of employees*			Annual revenues (Euro million)		Familiarity of non-adopters with SaaS since … years	
<10 (micro)	28.9	26.1	<1	28.2	<1	3.4
10–49 (small)	23.9	26.6	1–9	41.3	1–2	14.0
50–249 (medium-sized)	25.4	24.6	10–99	16.9	3–4	54.6
>250 (large)	21.8	22.7	>99	13.6	>5	28.0
Industry			Respondent title		Extent to which non-adopters consider adopting SaaS	
Manufacturing	28.9	29.0	CEO, CIO/CTO	24.9	Not yet considered adopting SaaS	1.4
Wholesale and trade	26.1	24.2	IS manager (business applications)	62.5	Track/monitor SaaS from the sidelines (neutral position)	31.9
Financial intermediation	16.2	14.0	Business operations manager, COO	8.4	Plan to evaluate SaaS in the near future	47.3
TIME**	9.9	12.1	Other managers and n/a	4.2	In the process of evaluating SaaS (with decision in the near future)	19.4
Construction and real estate	7.7	9.7			Other(s) (open question)	0.0
Logistics	4.9	5.3				
Public and healthcare	4.9	3.4				
Utilities***	1.4	2.4				

*Based on the classification of the European Commission; **TIME = Telecommunication, Information, Media and Entertainment industries; ***electricity/gas/water utilities.

Table 3
Operationalization of constructs.

Constructs	Indicators	Source
To what extent do you agree with the following statements:		
Intent. to incr. SaaS adoption (SaaS)	If there is a superior offer, a SaaS solution should be used for the application domain I am in charge of Our company should increase the existing level of adopting SaaS-based applications I support the further adoption of SaaS-based applications	Based on [24]
Perceived risks (PR)	Adopting SaaS applications is associated with a high level of risk There is a high level of risk that the expected benefits of adopting SaaS-based applications will not materialize Overall, I consider the adoption of SaaS-based applications to be risky	Based on [21]
Perceived opportunities (PO)	Adopting SaaS applications has many advantages Adopting SaaS applications is a useful instrument for increasing operational excellence Overall, I consider SaaS adoption to be a useful strategic option	Based on [24]
How do you perceive the risk that …		
Performance risk (PeR)	… the SaaS provider will not provide the promised service? … the SaaS provider will not perform the process to the desired quality (speed and reliability of network) and scope? … the service provider will not be able to ensure seamless interoperability with your homegrown applications?	Based on [24]
Economic risk (ER)	… the originally calculated business case will not include all the actual costs? … unanticipated costs that reduce the calculated cost savings will emerge? … the anticipated cost savings will not be achieved?	Based on [16]
Strategic risk (StR)	… through adoption of SaaS-based applications our company will lose its ability to react flexibly to changes in the market? … through adoption of SaaS-based applications, our company will depend highly on the sustainability (including bankruptcy) of the SaaS provider's business model? … through adoption of SaaS-based applications, our company will lose know-how that will be required to remain competitive in future markets?	Based on [19,39]
Security risk (SeR)	… the confidentiality and security of your business data are not guaranteed when adopting SaaS solutions? … in case of damage, present liability law is still unclear about who will bear the damage? … the SaaS provider will exploit contractual loopholes (i.e., incomplete contracting) to the detriment of your company?	Based on [5,21]
Managerial risk (MR)	… the adoption of SaaS-based applications for which you are responsible will damage your standing among colleagues, business partners and employees? … the adoption of SaaS-based applications for which you are responsible will negatively affect your standing within and outside the company? … the adoption of SaaS-based applications for which you are responsible will decrease the respect of colleagues, business partners and employees?	Based on [24]
Please rate the following statements:		
Cost advantages (CA)	A SaaS provider can deliver applications at lower costs than our company can. Our internal production costs are higher than the price a SaaS provider charges for its services. Adopting applications via a SaaS provider lowers the costs that arise from delivering application services. Overall, I believe that adopting SaaS is an appropriate measure to lower costs of application service provision.	Based on [41,16]
Strategic flexibility (SF)	Adopting SaaS applications allows quicker implementation of applications and faster time-to-value. By adopting SaaS applications, our company is better able to switch between IT providers. Adopting SaaS applications allows our company to reduce vendor lock-in due to lower sunk costs (e.g., past capital expenditures).	Based on [72]
Focus on core competencies (CC)	Adopting SaaS applications allows our company to enhance the individual capabilities that distinguish it from its competitors. By adopting SaaS applications, our company can concentrate better on putting its strategies into action. Overall, adopting SaaS applications is a good way to foster the company's concentration on its core competencies.	Based on [3]
Access to specialized resources (AR)	By adopting SaaS applications, our company can access resources (human and technological) that are not available internally. By accessing the resources of a SaaS provider, the application services can be delivered more effectively. Overall, adopting SaaS applications enables us to better access resources.	Based on [16]
Quality improvements (QI)	A SaaS provider has the potential to deliver application services at a higher quality than our company can. A SaaS provider is able to deliver application services in shorter release cycles and/or at a higher accuracy than our company can. By using short-term subscription-based contracts in SaaS, SaaS providers are forced to respond to customer needs more frequently. Overall, by adopting SaaS applications, the quality of application services will be improved.	Based on [24]

All standardized factor loadings are significant, thus suggesting convergent validity. To evaluate construct reliability, we calculated the composite reliability of each construct. All constructs have a composite reliability level that is significantly above the recommended cutoff value of 0.70 [64]. Likewise, all reflective constructs also met the recommended threshold value for average variance extracted (AVE>0.50). Regarding the discriminant validity of the latent variables, the loadings of our reflective indicators were higher with regard to their respective constructs than with regard to any other constructs. Additionally, the square roots of the AVEs exceeded the inter-construct correlations between the independent constructs, which were negligibly low. Therefore, the discriminant validity of the latent variables was deemed to be high. The same procedures were also conducted regarding the sub-models of adopters and non-adopters examined in this study. All constructs in these measurement models also satisfied the reliability and validity criteria mentioned above.

5.2. Structural model test for the aggregate data set

In our data analysis, we tested our research hypotheses using PLS-based structural equation modeling [9]. Unlike parameter-oriented and covariance-based structural equation modeling, the component-based PLS method is prediction oriented and places minimal restrictions on sample size and residual distributions. Tests using SPSS revealed that our data set contains a number of abnormally distributed variables. Thus, PLS was our method of choice.

Table 4
Results of measurement model assessment.

	Range of factor load.*	AVE	CR	SaaS	PR	PO	PeR	ER	StR	SeR	MR	CA	SF	CC	AR	QI
Total sample																
SaaS	0.943–0.961	0.904	0.966	**0.951**												
PR	0.898–0.947	0.857	0.947	−0.606	**0.926**											
PO	0.916–0.934	0.856	0.948	0.657	−0.511	**0.926**										
PeR	0.925–0.927	0.858	0.948	−0.462	0.511	−0.420	**0.926**									
ER	0.944–0.963	0.910	0.968	−0.456	0.543	−0.410	0.313	**0.954**								
StR	0.903–0.924	0.832	0.937	−0.434	0.515	−0.401	0.247	0.434	**0.912**							
SeR	0.843–0.939	0.823	0.933	−0.602	0.625	−0.413	0.330	0.362	0.355	**0.907**						
MR	0.962–0.965	0.928	0.975	−0.226	0.167	0.213	0.190	0.230	0.295	0.257	**0.963**					
CA	0.900–0.915	0.823	0.949	0.633	−0.434	0.633	−0.332	−0.311	−0.360	−0.277	−0.204	**0.907**				
SF	0.848–0.870	0.739	0.895	0.488	−0.419	0.596	−0.290	−0.218	−0.284	−0.253	−0.260	0.477	**0.860**			
CC	0.899–0.947	0.859	0.948	0.415	−0.480	0.460	−0.331	−0.283	−0.250	−0.263	−0.124	0.428	0.446	**0.927**		
AR	0.873–0.924	0.835	0.950	0.420	−0.453	0.465	−0.249	−0.201	−0.274	−0.218	−0.340	0.433	0.495	0.490	**0.909**	
QI	0.838–0.918	0.788	0.937	0.460	−0.440	0.531	−0.357	−0.204	−0.278	−0.230	−0.256	0.525	0.493	0.521	0.466	**0.888**
Adopters																
SaaS	0.844–0.911	0.781	0.914	**0.884**												
PR	0.844–0.915	0.795	0.921	−0.620	**0.891**											
PO	0.757–0.902	0.714	0.881	0.646	−0.566	**0.845**										
PeR	0.906–0.940	0.850	0.945	−0.591	0.535	−0.421	**0.922**									
ER	0.944–0.971	0.916	0.970	−0.351	0.285	−0.340	0.376	**0.957**								
StR	0.896–0.935	0.829	0.936	−0.430	0.530	−0.473	0.236	0.417	**0.910**							
SeR	0.806–0.945	0.797	0.921	−0.566	0.644	−0.330	0.375	0.375	0.362	**0.893**						
MR	0.952–0.973	0.930	0.976	−0.201	0.225	0.201	0.139	0.199	0.379	0.220	**0.964**					
CA	0.818–0.895	0.716	0.910	0.648	−0.413	0.654	−0.292	−0.238	−0.332	−0.254	−0.251	**0.846**				
SF	0.759–0.836	0.742	0.843	0.496	−0.387	0.567	−0.345	−0.222	−0.312	−0.246	−0.160	0.494	**0.861**			
CC	0.748–0.979	0.612	0.734	0.376	−0.355	0.474	−0.295	−0.271	−0.259	−0.231	−0.038	0.425	0.385	**0.782**		
AR	0.725–0.865	0.633	0.872	0.432	−0.359	0.480	−0.227	−0.243	−0.225	−0.221	−0.207	0.462	0.469	0.471	**0.795**	
QI	0.771–0.853	0.677	0.893	0.401	−0.459	0.362	−0.352	−0.220	−0.292	−0.293	−0.274	0.440	0.470	0.485	0.457	**0.823**
Non-adopters																
SaaS	0.936–0.953	0.887	0.959	**0.942**												
PR	0.861–0.934	0.808	0.927	−0.548	**0.899**											
PO	0.918–0.927	0.849	0.944	0.679	−0.533	**0.922**										
PeR	0.885–0.893	0.789	0.918	−0.294	0.416	−0.415	**0.888**									
ER	0.916–0.932	0.854	0.946	−0.483	0.550	−0.536	0.338	**0.924**								
StR	0.875–0.892	0.783	0.915	−0.322	0.406	−0.415	0.327	0.420	**0.885**							
SeR	0.824–0.918	0.774	0.911	−0.597	0.658	−0.417	0.357	0.366	0.322	**0.880**						
MR	0.951-0.970	0.920	0.972	−0.215	0.165	−0.287	0.069	0.106	0.176	0.120	**0.959**					
CA	0.892–0.918	0.807	0.944	0.582	−0.460	0.603	−0.243	−0.333	−0.320	−0.273	−0.164	**0.898**				
SF	0.825–0.850	0.701	0.875	0.420	−0.369	0.515	−0.250	−0.332	−0.282	−0.271	−0.187	0.457	**0.837**			
CC	0.921–0.952	0.887	0.959	0.408	−0.362	0.497	−0.294	−0.263	−0.273	−0.223	−0.124	0.437	0.459	**0.942**		
AR	0.879–0.925	0.822	0.949	0.280	−0.366	0.418	−0.252	−0.286	−0.244	−0.212	−0.206	0.416	0.457	0.486	**0.907**	
QI	0.820–0.908	0.920	0.972	0.472	−0.428	0.511	−0.306	−0.282	−0.256	−0.272	−0.182	0.520	0.445	0.533	0.445	**0.875**

Note: Square root of AVE is listed on diagonal; *all factor loadings are significant at the p = 0.001 level.

The results in Fig. 3 indicate that 69% of the variance in perceived risk was explained and 81% of the variance in perceived opportunities associated with SaaS-based sourcing. In addition, perceived opportunities and risks explained 83% of the variance in intention to increase the level of SaaS adoption. The results also show that the path coefficients in the research model are all significant, except for the paths leading from managerial risks to perceived risk, and from focus on core competencies, as well as access to specialized resources, to perceived opportunities of SaaS adoption. Overall, our data supported hypotheses 1–6, 8, 9, and 12, while hypotheses 7, 10, and 11 were not.

5.3. Comparing SaaS adopters and non-adopters

To address our second research question, structural equation models, based on the two sub-samples of adopters and non-adopters, were run. As in the assessment of the full sample, standardized path coefficients and the share of variance explained (R^2) were analyzed and compared (see Table 5).

In the non-adopter sample, financial and security risk have strongly positive and significant paths leading to the perceived risk of SaaS adoption, which, in turn, has a strong and negative effect on IT executives' intention to increase the level of SaaS adoption. The performance, strategic, and managerial risk factors are not significantly associated with the perceived risk of SaaS adoption. Furthermore, cost advantages, strategic flexibility, a focus on core competencies, and quality improvements were significantly related to perceived opportunities associated with SaaS adoption. Access to specialized resources was the only factor that did not significantly affect IT executives' perceived opportunities associated with SaaS adoption. The independent factors explain a total of 56% of the variance in perceived risk and 78% of the variance in perceived opportunities associated with SaaS adoption, which explains 80% of the variance in intention to increase the level of SaaS adoption. In contrast, in the adopter sample, the five risk factors can explain 64% of the variance in the perceived risk of SaaS adoption, whereas the opportunity factors explain 67% of the variance in the perceived opportunities associated with SaaS adoption. Overall, the model explains 66% of the variation in intention to increase the level of SaaS adoption. All path coefficients in the adopter model are significant, with the exception of paths from financial and managerial risks to perceived risk of SaaS adoption, as well as of paths from focus on core competencies and quality improvements to perceived opportunities of SaaS adoption.

Table 5 highlights the effect sizes f^2 of the total model and each sub-model tested, indicating the importance of each influencing factor. Cohen's effect size f^2 is an indicator of the change in R^2 when one latent exogenous variable at a time is excluded from the analysis. The f^2-values of 0.02, 0.15, and 0.35 indicate whether an exogenous variable has, respectively, a weak, moderate, or substantial effect on

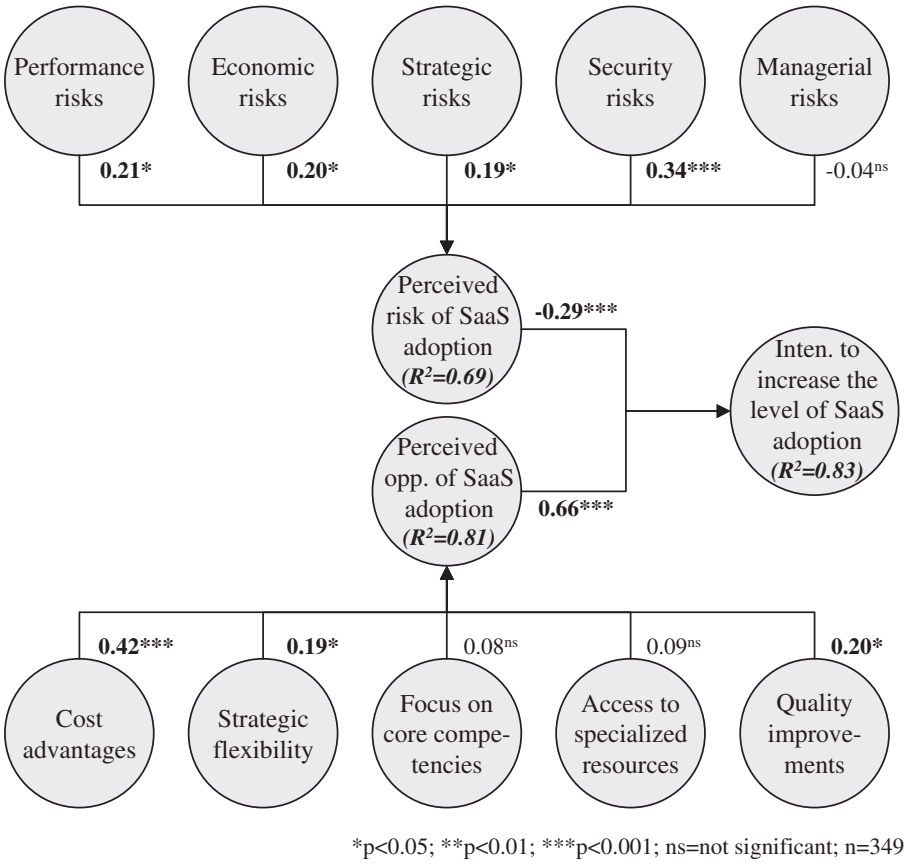

Fig. 3. PLS Test of structural model.

the endogenous variable with which each is associated [9]. The perceived opportunities of SaaS adoption have larger effect sizes on both the total model and the sub-models of adopters and non-adopters, and, therefore, have a stronger influence on IT executives' intention to increase SaaS adoption than do the perceived risks. In addition, security risks and cost advantages are the factors with the highest effect sizes, indicating that they are the most prevalent factors informing IT executives' overall opportunity-risk appraisals.

As shown in our previous results, the significance and relative importance of risk and opportunity factors vary between adopters and non-adopters. To test whether these differences are significant, we conducted a multi-group comparison with PLS (e.g., [59]). In respect to every sub-sample, 200 β-coefficients were generated for the paths between the risk factors and the perceived risk of SaaS adoption, and between the opportunity factors and the perceived opportunities through SaaS adoption, by means of the PLS bootstrapping routine. Table 6 summarizes the descriptive statistics for the β-coefficients generated with PLS in respect of both adopters and non-adopters.

Based on these values, a *t*-test was conducted to test the significance of the difference between the adopters and non-adopters. A Levene test for equality of variances indicated that in respect to both sub-samples across all investigated relationships, the variance for adopters and non-adopters is equal. Based on the results of the *t*-tests, one can conclude that on a $p<0.001$ level, there are significant differences between non-adopters and adopters in respect to all relationships, with the exception of the relationship between security risks and total perceived risk of SaaS adoption.

6. Discussion

To the best of our knowledge, this is the first empirical study to examine a comprehensive set of risk and opportunity factors in SaaS adoption from the perspectives of SaaS adopters and non-adopters. On the basis of a discussion of our findings on the overall and sub-sample level, several theoretical and practical implications emerge.

Table 5
Structural model results of total model (SaaS adopters and non-adopters).

	R^2			Path coefficients (effect size f^2)											
	SaaS	PR	PO	PR→SaaS	PO→SaaS	PeR→PR	ER→PR	StR→PR	SeR→PR	MR→PR	CA→PO	SF→PO	CC→PO	AR→PO	QI→PO
Adopters (n=142)	0.655	0.644	0.666	−0.350*** (0.145)	0.510*** (0.307)	0.321*** (0.084)	0.095ns (0.001)	0.251** (0.056)	0.319*** (0.149)	−0.146ns (0.028)	0.454*** (0.308)	0.224** (0.072)	0.045ns (0.006)	0.151* (0.024)	0.121ns (0.002)
Non-adopters (n=207)	0.796	0.562	0.778	−0.225** (0.118)	0.714*** (0.363)	0.063ns (0.002)	0.311*** (0.091)	0.161ns (0.027)	0.339*** (0.181)	0.009ns (0.000)	0.402*** (0.178)	0.160* (0.042)	0.148* (0.036)	0.027ns (0.000)	0.231** (0.054)
Total model (n=349)	0.833	0.689	0.811	−0.290*** (0.174)	0.661*** (0.329)	0.210* (0.039)	0.197* (0.043)	0.190* (0.035)	0.337*** (0.162)	−0.042ns (0.006)	0.418*** (0.228)	0.194* (0.064)	0.084ns (0.021)	0.089ns (0.001)	0.202* (0.042)

ns = not significant.
*** p<0.001.
** p<0.01.
* p<0.05.

Table 6
Descriptives of β-coefficients and *t*-test results of multi-group comparison.

Group comparison		Descriptives of β-coefficients			*t*-test for mean equality			
Relationship	Groups	Mean	SD	SE	t	Sig.	ΔMean	ΔSE
PeR → PR	ADOPT	0.309	0.135	0.010	22.838	0.000	0.241	0.002
	NONADOPT	0.068	0.119	0.008				
ER → PR	ADOPT	0.112	0.127	0.009	−17.668	0.000	−0.191	0.001
	NONADOPT	0.303	0.120	0.008				
StR → PR	ADOPT	0.263	0.095	0.007	10.352	0.000	0.102	−0.001
	NONADOPT	0.161	0.113	0.008				
SeR → PR	ADOPT	0.319	0.119	0.008	−1.855	0.065	−0.020	0.001
	NONADOPT	0.339	0.096	0.007				
MR → PR	ADOPT	−0.132	0.123	0.009	−16.489	0.000	−0.144	0.004
	NONADOPT	0.012	0.066	0.005				
CA → PO	ADOPT	0.452	0.093	0.007	4.558	0.000	0.047	−0.001
	NONADOPT	0.404	0.117	0.008				
SF → PO	ADOPT	0.210	0.108	0.008	6.538	0.000	0.064	0.001
	NONADOPT	0.146	0.093	0.007				
CC → PO	ADOPT	0.045	0.061	0.004	−14.994	0.000	−0.100	−0.001
	NONADOPT	0.145	0.071	0.005				
AR → PO	ADOPT	0.162	0.097	0.007	12.260	0.000	0.122	−0.001
	NONADOPT	0.041	0.116	0.008				
QI → PO	ADOPT	0.113	0.125	0.009	−11.198	0.000	−0.119	0.002
	NONADOPT	0.232	0.101	0.007				

6.1. Discussion of findings

Based on the overall sample, we found that cost advantages were the strongest and most consistent opportunity factor significantly affecting perceived opportunities, which was followed by strategic flexibility and quality improvements. IT executives apparently perceive SaaS adoption primarily as a cost savings lever that helps them decrease their capital expenditures while increasing cash flows. SaaS adoption intentions are, however, not solely driven by possible cost or quality improvements. Rather, these intentions are also affected by the belief that SaaS will provide a greater degree of freedom in future software selection decisions, as indicated by strategic flexibility's significant impact. Of the major risk factors driving SaaS adoption intentions, security risks were the dominant factor, followed by performance and economic risks. Thus, IT executives seem to be mainly concerned with data security issues and potential contractual loopholes that could be exploited to the detriment of customers. Unlike security risks, managerial risks did not play a significant role in forming overall perceived risk. IT executives obviously do not fear losing face or control over resources when weighing the possibility of SaaS adoption. This lack of fear may be due to the current investments in SaaS still being relatively small and, thus, not substituting major resources used in-house. Notably, our results reveal that the perceived opportunities and risks of SaaS adoption were not factored into decision intentions to the same extent. Perceived opportunities tend to have a much stronger impact on SaaS adoption decision than perceived risks do. This has important implications, as it shows that potential market failure may not be the major factor in make-or-buy choices regarding SaaS adoption. Instead, opportunities seem to be more influential than risks.

Our findings are partly consistent with previous studies on ITO and ASP research. These findings indicate that cost advantages, quality improvements, as well as performance, economic, and strategic risks are significant factors affecting the intention to increase the level of outsourcing, whereas managerial risks are not [24,25,35]. However, as argued at the beginning of our paper, the relative importance of the different opportunity factors and types of risk in explaining SaaS adoption intentions has changed. In the traditional ITO literature, researchers have found that, in most cases, strategic benefits and economic risks outweigh other factors (e.g., [5,24]). However, cost advantages and security risks are much more prevalent in SaaS. Likewise, whereas performance risk (such as application availability or seamless interoperability) has been considered one of the most crucial aspects of risk in the ASP model (e.g., [41]), it is not IT executives' dominant concern in the SaaS model, although this aspect is still important.

When we compare the sub-samples of adopters and non-adopters, some noteworthy differences between specific opportunities and risks' impacts emerge. These differences indicate that adopters and non-adopters of technology are indeed driven by different factors [71]. Interestingly, IT executives in non-adopter firms expect SaaS to introduce quality improvements and free up attention from non-core business activities. However, as perceived by IT executives at adopter firms, actual experiences with the delivery of SaaS are somewhat different. Quality improvements and the focus on core competencies fail to drive intentions to increase SaaS adoption levels. A plausible explanation for this result may be that, unlike traditional application outsourcing, SaaS has primarily been adopted in application areas that require lower levels of system customization (e.g., office or collaboration systems). Such application areas thus mostly do not affect the strategic core of a company's application architecture [7]. However, since SaaS is maturing and becoming relevant to core application system areas (e.g., ERP, SCM), IT executives at non-adopter firms may also begin to hope that SaaS adoption will help them focus on their core competencies and provide quality improvements on a larger scale. However, this explanation is speculative and additional research needs to be conducted to examine why there are divergences in SaaS adopters and non-adopters' perceptions regarding specific opportunity factors.

We also discovered differences regarding risks between the perceptions of IT executives at adopter and non-adopter firms. Whereas economic risks were a crucial risk factor for non-adopters, they did not play a significant role for SaaS adopters. Apparently, non-adopters are still skeptical of SaaS vendors' promises that customers will experience lower total ownership cost when sourcing applications via SaaS than with traditional on-premise installations. In contrast, SaaS adopters actually do not consider economic risks to be most prevalent, from which we may infer that they are satisfied with the basic SaaS economics. Conversely, non-adopters seem to assume that performance and strategic risks are less prevalent in a SaaS vendor relationship with a SaaS provider. However, as evidenced by our results, performance and strategic risks are major factors affecting perceived risk, indicating that the loss of innovative capacity (i.e., loss of the cross-functional IT skills and know-how necessary to facilitate innovation) and potential system outages or Internet network instability are indeed considered major SaaS adoption risks.

6.2. Theoretical contributions

Overall, our empirical results have offered solid support for our opportunity-risk model of SaaS adoption. Previous studies on ITO and ASP have primarily drawn on theories that explain decision outcomes and have treated the decision process as a black box. This paper's first theoretical contribution is that it demonstrates that opening the black box of IT executives' (cognitive) decision-making process helps provide an insightful perspective on organizational decision-making. This perspective reveals the opportunities and risks that contribute to the formation of adoption intentions and the extent to which they do so. In this way, our research model may not only indicate the decision outcomes as reflected in IT executives' behavioral intentions, but may also advance our understanding of the process of balancing different salient beliefs regarding opportunity and risk factors prior to a decision. Consequently the decision-making process thus becomes more transparent and traceable.

This model's second theoretical contribution is that it reveals that the existing outsourcing and risk theories to which we referred in our model, mirror a large area of IT executives' overall risk and opportunity appraisals. The high levels of variance explained regarding perceived risk and perceived opportunities indicate this finding. Therefore, we believe that these ITO and risk theories are rich conceptual lenses for the formation of salient behavioral beliefs about SaaS adoption's opportunities and risks. Furthermore, we believe that extensions or refinements are only likely to add minor explanatory power.

6.3. Implications for practice

In addition to its theoretical contributions, this study also offers several practical implications. Our study has produced a comprehensive set of opportunities and risks to be considered in the SaaS adoption decision. The study has also uncovered insightful differences between the perceptions of IT executives from SaaS adopter and non-adopter firms. On the basis of our results, non-adopters of SaaS can conclude that they should reassess their economic and performance evaluations of SaaS-based application services. They seem to overestimate SaaS's total cost of ownership, whereas they underestimate strategic and performance issues, as well as specialization opportunities. Before adopting or rejecting SaaS, non-adopters should therefore compare their individual context with those of a meaningful set of SaaS-adopting peers. According to our findings, SaaS adopters should primarily seek to eliminate security and performance risks. Possible risk-mitigation strategies may involve developing detailed contracts with the SaaS provider, including mandatory security standards (e.g., data encryption technologies and virtual private networks), penalties for data breaches or non-performance (for supplier-caused failures), or the inclusion of third parties to guarantee the availability and integrity of data (i.e., so-called "escrow services") and to safeguard the company against major business risks (e.g., bankruptcy).

Our study also provides SaaS vendors with insights into which factors they should emphasize or avoid when offering SaaS services to companies at different stages of the technology adoption lifecycle. The assessment of the perceived opportunities and risks showed that potential clients appear to overestimate the total cost of SaaS ownership and are unaware of the specialized capabilities that SaaS providers offer. However, adopters still seem to wrestle with problems arising from performance and quality issues and from a loss of innovative capacity. In addition, both adopters and non-adopters consider security risks to be the most crucial factor in their reluctance to adopt SaaS. Therefore, SaaS providers may learn that they should address potential and actual SaaS clients' risk concerns differently. In particular, decreasing non-adopters' perceived security and economic risks, and raising their awareness of the specialized resources that a SaaS provider can offer, will be important for providers looking to gain SaaS accounts. In this regard, SaaS providers may use reference cases to convince potential clients of SaaS services' superior capabilities and economics and to show their "track record" regarding providing secure services. To address performance and quality issues as perceived by actual SaaS clients, SaaS providers should not only take note of their own shortcomings ("supplier-caused failures"), improving service excellence and targeting a higher design quality, but also help their customers overcome Internet-related problems by ensuring that clients' Internet service providers deliver a redundant, high-quality, or even dedicated Internet connection for the purpose of risk mitigation and risk sharing.

7. Limitations and future research

As with any research, this study has several limitations. First, our study focused on a specific set of risks and opportunities reflecting those used in prior research studies. Future studies may include other opportunities (e.g., service and product innovation opportunities) and risks (e.g., compliance risks) associated with SaaS adoption that may grow in importance over time. Second, our empirical analysis focused on comparisons of IT executives' perceptions of SaaS adopter and non-adopter firms, neglecting other interesting inter-group effects. Further research should therefore investigate how the relative importance of opportunity and risk factors differs across industries, company sizes, and application types. In addition, in our sample, we did not explicitly distinguish between non-adopters who had made a deliberate decision against SaaS adoption and those who had not yet made a clear decision. Future studies that include such a distinction may provide a more nuanced view of non-adopters' assessments of SaaS opportunities and risks. Third, our preference for perceptual data reflects our choice to operationalize opportunity and risk antecedents in terms of managers' perceptions. This preference by no means precludes the development of other operationalizations embedded in alternate research methods examining actual SaaS opportunities and risks (e.g., using structured content analysis of cases and descriptions, expert interviews, and database archival analysis) and other perceptions (e.g., those of users and IT professionals). Fourth, the external validity of our results may also be undermined by common method variance, as we collected data from participants at the same time using the same survey. However, to analyze common method bias, we used several tests [57]. We initially used Harman's one-factor test, which showed that all constructs explain roughly equal amounts of variance; there was no indication for common method bias. Thereafter, a correlational marker technique was used in which the highest variable from the factor analysis was entered as an additional independent variable. This variable did not create a significant change in the variance explained for the dependent variables. Finally, another limitation of our study is that the IT executives made their SaaS opportunity and risk assessments independent of the distinction between *green-field adoption* and *replacement decisions*. This approach may have had an influence on IT executives' beliefs regarding the opportunities and risks of SaaS adoption. Future studies should therefore analyze how perceptions regarding SaaS opportunities and risks differ between these two starting positions.

References

[1] I. Ajzen, M. Fishbein, Understanding Attitudes and Predicting Social Behavior, Prentice Hall, Englewood Cliffs, NY, 1980.
[2] M. Alsudairi, Y.K. Dwivedi, A multi-disciplinary profile of IS/IT outsourcing research, Journal of Enterprise Information Management 23 (2) (2010) 215–258.
[3] U.M. Apte, M.G. Sobol, S. Hanaoka, T. Shimada, T. Saarinen, T. Salmela, A.P.J. Vepsalainen, IS outsourcing practices in the USA, Japan and Finland: a comparative study, Journal of Information Technology 12 (4) (1997) 289–304.
[4] M. Armbrust, A. Fox, R. Griffith, A.D. Joseph, R. Katz, A. Konwinski, G. Lee, D.i. Patterson, A. Rabkin, I. Stoica, M. Zaharia, A view of cloud computing, Communications of the ACM 53 (4) (2010) 50–58.
[5] B. Bahli, S. Rivard, The Information Technology outsourcing risk: a transaction cost and agency theory-based perspective, Journal of Information Technology 18 (3) (2003) 211–221.
[6] J. Barthélemy, The hidden costs of IT outsourcing, Sloan Management Review 42 (3) (2001) 60–69.

[7] A. Benlian, T. Hess, P. Buxmann, Drivers of SaaS-adoption: an empirical study of different application types, Business & Information Systems Engineering 1 (5) (2009) 357–369.
[8] J.R. Bettman, Perceived risk and its components: a model and empirical test, Journal of Marketing Research 10 (2) (1973) 184–190.
[9] W.W. Chin, The Partial Least Squares approach for structural equation modelling, in: G.A. Marcoulides (Ed.), Modern Methods for Business Research, Lawrence Erlbaum Associates, Hillsdale, NJ, 1998, pp. 295–336.
[10] V. Choudhary, Comparison of software quality under perpetual licensing and software as a service, Journal of Management Information Systems 24 (2) (2007) 141–165.
[11] P. Chwelos, I. Benbasat, A.S. Dexter, Research report: empirical test of an EDI adoption model, Information Systems Research 12 (3) (2001) 304–321.
[12] S. Cunningham, The major dimensions of perceived risk, in: D.F. Cox (Ed.), Risk Taking and Information Handling in Consumer Behavior, Harvard University Press, Cambridge, MA, 1967, pp. 102–108.
[13] W.L. Currie, B. Desai, N. Khan, Customer evaluation of application services provisioning in five vertical sectors, Journal of Information Technology 19 (1) (2004) 39–58.
[14] M.A. Cusumano, Cloud computing and SaaS as new computing platforms, Communications of the ACM 53 (4) (2010) 27–29.
[15] R.L. Daft, Organization Theory and Design, 3rd Edition West Publishing Co, St. Paul, MN, 1989.
[16] J. Dibbern, Sourcing of Application Software Services — Empirical Evidence of Cultural, Industry and Functional Differences, Physica-Verlag, Heidelberg, New York, 2004.
[17] J. Dibbern, T. Goles, R. Hirschheim, B. Jayatilaka, Information systems outsourcing: a survey and analysis of the literature, ACM SIGMIS Database 35 (4) (2004) 6–102.
[18] P.J. DiMaggio, W.W. Powell, The iron cage revisited: institutional isomorphism and collective rationality in organizational fields, American Sociological Review 48 (2) (1983) 147–160.
[19] M.J. Earl, The risks of outsourcing IT, Sloan Management Review 37 (3) (1996) 26–32.
[20] R.M. Emerson, Social exchange theory, Annual Review of Sociology 2 (1) (1976) 335.
[21] M.S. Featherman, P.A. Pavlou, Predicting e-services adoption: a perceived risk facets perspective, International Journal of Human Computer Studies 59 (4) (2003) 451–474.
[22] M. Fishbein, I. Ajzen, Belief, Attitude, Intention and Behavior: An Introduction to Theory and Research, Addison-Wesley, Reading, MA, 1975.
[23] B. Gee-Woo, R.W. Zmud, K. Young-Gul, L. Jae-Nam, Behavioral intention formation in knowledge sharing: examining the roles of extrinsic motivators, social-psychological forces, and organizational climate, MIS Quarterly 29 (1) (2005) 87–111.
[24] H. Gewald, J. Dibbern, Risks and benefits of business process outsourcing: a study of transaction services in the German banking industry, Information and Management 46 (4) (2009) 249–257.
[25] H. Gewald, K. Wüllenweber, T. Weitzel, The influence of perceived risks on banking managers' intention to outsource business processes — a study of the German banking and finance industry, Journal of Electronic Commerce Research 7 (2) (2006) 78–96.
[26] R. Gonzalez, J. Gasco, J. Llopis, Information systems outsourcing: a literature analysis, Information Management 43 (7) (2006) 821–834.
[27] R. Gonzalez, J. Gasco, J. Llopis, Information systems outsourcing reasons and risks: an empirical study, International Journal of Social Sciences 4 (3) (2009) 180–191.
[28] R.M. Grant, The resource-based theory of competitive advantage: implications for strategy formulation, California Management Review 33 (3) (1991) 114–135.
[29] O. Günther, G. Tamm, L. Hansen, T. Meseg, Application service providers: supply, demand and long-term perspectives, Wirtschaftsinformatik 43 (6) (2001) 555–567.
[30] D. Harrison, P. Mykytyn Jr., C. Riemenschneider, Executive decisions about adoption of information technology in small business: theory and empirical tests, Information Systems Research 8 (2) (1997) 171–195.
[31] O. Hart, Incomplete contracts and the theory of the firm, Journal of Law, Economics, & Organization 4 (1) (1988) 119–139.
[32] H. Hasan, E. Gould, Support for the sense-making activity of managers, Decision Support Systems 31 (1) (2001) 71–86.
[33] R. Hirschheim, M.J. Lacity, The myths and realities of information technology outsourcing, Communications of the ACM 43 (2) (2000) 99–107.
[34] R.A. Howard, Decision analysis: practice and promise, Management Science 34 (6) (1988) 679–695.
[35] B. Jayatilaka, A. Schwarz, R. Hirschheim, Determinants of ASP choice: an integrated perspective, European Journal of Information Systems 12 (3) (2003) 210–224.
[36] M.C. Jensen, W.H. Meckling, Theory of the firm: managerial behavior, agency costs and ownership structure, Journal of Financial Economics 3 (1976) 305–360.
[37] J. Jurison, The role of risk and return in information technology outsourcing decisions, Journal of Information Technology 10 (4) (1995) 239–247.
[38] R.J. Kauffman, R. Sougstad, Risk management of contract portfolios in IT services: the profit-at-risk approach, Journal of Management Information Systems 25 (1) (2008) 17–48.
[39] T. Kern, J. Kreijger, L. Willcocks, Exploring ASP as sourcing strategy: theoretical perspectives, propositions for practice, The Journal of Strategic Information Systems 11 (2) (2002) 153–177.
[40] T. Kern, M.C. Lacity, L. Willcocks, Netsourcing: Renting Business Applications and Services over a Network, Prentice-Hall, New York, 2002.
[41] T. Kern, L.P. Willcocks, M.C. Lacity, Application service provision: risk assessment and mitigation, MIS Quarterly Executive 1 (2) (2002) 113–126.
[42] D.J. Kim, D.L. Ferrin, H.R. Rao, A trust-based consumer decision-making model in electronic commerce: the role of trust, perceived risk, and their antecedents, Decision Support Systems 44 (2) (2008) 544–564.
[43] N. Kumar, L.W. Stern, J.C. Anderson, Conducting interorganizational research using key informants, The Academy of Management Journal 36 (6) (1993) 1633–1651.
[44] M.C. Lacity, R. Hirschheim, The information systems outsourcing bandwagon, Sloan Management Review 35 (1) (1993) 73–86.
[45] M.C. Lacity, L. Willcocks, An empirical investigation of Information Technology sourcing practices: lessons from experience, MIS Quarterly 22 (3) (1998) 363–408.
[46] M.C. Lacity, L.P. Willcocks, D.F. Feeny, IT outsourcing: maximize flexibility and control, Harvard Business Review 73 (3) (1995) 84–93.
[47] M.C. Lacity, S.A. Khan, L.P. Willcocks, A review of the IT outsourcing literature: insights for practice, The Journal of Strategic Information Systems 18 (3) (2009) 130–146.
[48] N. Levina, J.W. Ross, From the vendor's perspective: exploring the value proposition in information technology outsourcing, MIS Quarterly 27 (3) (2003) 331–364.
[49] L. Loh, N. Venkatraman, An empirical study of Information Technology outsourcing: benefits, risks, and performance implications, Proceedings of the 16th International Conference on Information Systems, Amsterdam, The Netherlands, 1995, pp. 277–288.
[50] M.J. Machina, Decision-making in the presence of risk, Science 236 (4801) (1987) 537–543.
[51] S. Marston, Z. Li, S. Bandyopadhyay, J. Zhang, A. Ghalsasi, Cloud computing — the business perspective, Decision Support Systems 51 (1) (2011) 176–189.
[52] S.A. Mertz, C. Eschinger, T. Eid, H.H. Huang, C. Pang, B. Pring, Market Trends: Software as a Service, Worldwide, 2008–2013, Gartner, Stamford, CT, 2009.
[53] J.P. Peter, M.J. Ryan, An investigation of perceived risk at the brand level, Journal of Marketing Research 13 (2) (1976) 184–188.
[54] C. Pettey, Gartner says 25 percent of new business software will be delivered as Software as a Service by 2011available at, http://www.gartner.com/it/page.jsp?id=4968862006(accessed 08 December 2010).
[55] J. Pfeffer, G.R. Salancik, The External Control of Organisations: A Resource Dependence Perspective, Harper and Row, New York, 1978.
[56] A. Pinsonneault, K.L. Kraemer, Survey research methodology in management information systems: an assessment, Journal of Management Information Systems 10 (2) (1993) 75–105.
[57] P.M. Podsakoff, S.B. Mackenzie, J. Lee, N.P. Podsakoff, Common method biases in behavioral research: a critical review of the literature and recommended remedies, The Journal of Applied Psychology 88 (5) (2003) 879–903.
[58] L. Poppo, T.R. Zenger, Testing alternative theories of the firm: transaction cost, knowledge-based, and measurement explanations for make-or-buy decisions in information services, Strategic Management Journal 19 (9) (1998) 853–877.
[59] I. Qureshi, D. Compeau, Assessing between-group differences in information systems research: a comparison of covariance- and component-based SEM, MIS Quarterly 33 (1) (2009) 197–214.
[60] A. Rai, V. Sambamurthy, The growth of interest in services management: opportunities for Information Systems scholars, Information Systems Research 17 (4) (2006) 327–331.
[61] H.A. Simon, The New Science of Management Decision, Harper, New York, 1960.
[62] C. Singh, R. Shelor, J. Jiang, G. Klein, Rental software valuation in IT investment decisions, Decision Support Systems 38 (1) (2004) 115–130.
[63] G.F. Smith, Towards a theory of managerial problem solving, Decision Support Systems 8 (1) (1992) 29–40.
[64] D. Straub, Validating instruments in MIS research, MIS Quarterly 13 (2) (1989) 147–169.
[65] A. Susarla, A. Barua, A. Whinston, Understanding the service component of application service provision: an empirical analysis of satisfaction with ASP services, MIS Quarterly 27 (1) (2003) 91–123.
[66] A. Susarla, A. Barua, A.B. Whinston, A transaction cost perspective of the "software as a service" business model, Journal of Management Information Systems 26 (2) (2009) 205–240.
[67] J.T.C. Teng, M.J. Cheon, V. Grover, Decisions to outsource information systems functions: testing a strategy-theoretic discrepancy model, Decision Sciences 26 (1) (1995) 75–103.
[68] J.S. Valacich, S. Sarker, J. Pratt, M. Groomer, Understanding risk-taking behavior of groups: a "decision analysis" perspective, Decision Support Systems 46 (4) (2009) 902–912.
[69] P. Valente, G. Mitra, The evolution of web-based optimisation: from ASP to e-services, Descision Support Systems 43 (4) (2007) 1096–1116.
[70] A.H. Van de Ven, Engaged Scholarship: A Guide for Organizational and Social Research, Oxford University Press, New York, 2007.
[71] V. Venkatesh, S.A. Brown, A longitudinal investigation of personal computers in homes: adoption determinants and emerging challenges, MIS Quarterly 25 (1) (2001) 71–102.
[72] D. Whitten, S. Chakrabarty, R. Wakefield, The strategic choice to continue outsourcing, switch vendors, or backsource: do switching costs matter? Information and Management 47 (3) (2010) 167–175.
[73] L. Willcocks, G. Fitzgerald, Market as opportunity? Case studies in outsourcing information technology and services, The Journal of Strategic Information Systems 2 (3) (1993) 223–242.
[74] L. Willcocks, G. Fitzgerald, M. Lacity, To outsource IT or not? Recent research on economics and evaluation practice, European Journal of Information Systems 5 (3) (1996) 143–160.

[75] O.E. Williamson, The economics of organization: the transaction cost approach, The American Journal of Sociology 87 (3) (1981) 548–577.
[76] M. Xin, N. Levina, Software-as-a-service model: elaborating client-side adoption factors, Proceedings of the Twenty-ninth International Conference on Information Systems, Paper 86, Paris, France, 2008.
[77] L. Youseff, M. Butrico, D. Da Silva, Toward a unified ontology of cloud computing, Grid Computing Environments (GCE) Workshop, IEEE, Austin, Texas, 2008, pp. 1–10.

Alexander Benlian is an Assistant Professor of Business Administration and Management Information Systems at the University of Munich, Germany. Alexander holds a Ph. D. in Business Administration and Management Information Systems from the University of Munich, Germany. His research interests include Software-as-a-Service, the evaluation and selection of enterprise application systems, and recommender systems in electronic commerce. His work has been published in international journals such as *Journal of Management Information Systems*, *Information Systems Journal*, *European Journal of Information Systems*, *International Journal of Electronic Commerce*, *Information & Management*, *Journal of Business & Information Systems Engineering* and conferences such as *International Conference on Information Systems (ICIS)*, *European Conference on Information Systems (ECIS)*, and *Americas Conference on Information Systems (AMCIS)*.

Thomas Hess is Professor of Management Information Systems at the University of Munich, Germany, where he also serves as director of the Institute for Information Systems and New Media and as coordinator of the Center for Internet Research and Media Integration. Thomas holds a Ph.D. in Management from the University of St. Gallen, Switzerland. His research interests include digitalization strategies, digital products, media management, and economics of information systems. His work has appeared in international journals such as *Journal of Management Information Systems*, *Information Systems Journal*, *Communications of the ACM*, *Electronic Markets*, *Information & Management*, and *The Information Society*. Thomas has also published in the proceedings of conferences such as *International Conference on Information Systems* (*ICIS*) *European Conference on Information Systems (ECIS)*, and *Americas Conference on Information Systems* (*AMCIS*).