Information & Management 51 (2014) 320–335

Contents lists available at ScienceDirect

Information & Management

journal homepage: www.elsevier.com/locate/im

The impact of IT outsourcing on information systems success

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ARTICLE INFO

Article history:
Received 3 May 2012
Received in revised form 5 November 2013
Accepted 31 December 2013
Available online 5 February 2014

Dedication: This article is dedicated in memory of my beloved wife Swarnalatha Gorla, who meant everything to me – Narasimhaiah Gorla.

Keywords:
Service quality
IS success models
Outsourcing
Usefulness
Usage
User satisfaction

ABSTRACT

The objective of this research is to assess the impact of IT outsourcing on Information Systems' success. We modeled the relationships among the extent of IT outsourcing, the ZOT (the Zone of Tolerance), and IS success. We justified our model using the expectancy–disconfirmation theory, the agency theory, and transaction cost economics, and we empirically tested it using structural equation modeling with responses from IS users. We found significant direct and indirect effects (through the service quality) of outsourcing on IS systems' perceived usefulness and their users' satisfaction. Whereas the extent of outsourcing is negatively related to the service quality and perceived usefulness, the ZOT-based IS service quality is positively related to the user satisfaction.

1. Introduction

Information Systems (IS) products and services have traditionally been delivered by internal IS departments. However, IS outsourcing has become an alternate or complementary delivery mechanism. IS outsourcing has been growing at the rate of 14% annually [64], and the current IT services market is valued at $746 billion [41]. In addition to the IT outsourcing trend in the industry, the research in the area has been enormous in scale: there have been 164 empirical studies conducted on IT outsourcing over the last 20 years [55]. While some of the motivations of companies for IS outsourcing have been their core business, the rapid introduction of new products, cost reductions, increased access to technical expertise, and the lack of the required internal resources [17,34], internal IS users have been dissatisfied with IT outsourcing. For instance, satisfaction with IS outsourcing has been reported at a rate of only 33%, compared with 70–80% for non-IT outsourced activities [91]. Indeed, a survey has shown that out of 160 IS projects that were outsourced, only 70 projects were continued; the remaining 90 discontinued their current contracts either by switching vendors or by backsourcing [93]. Problems with IT outsourcing include degradations of service, the lack of vendor commitment [72], the ineffectiveness of a vendor [61,32], delayed deliveries of data, and slow implementations [4].

In view of the risk factors just mentioned, companies might have to reconsider their original strategic decisions to outsource IT, which they had thought would provide strategic, economic, operational, and technological advantages. Due to the high failure rates of IT outsourcing, the current research returns people's focus to the original decision making process: whether IT outsourcing is a good decision that will benefit the company and internal IS users and whether the decision to outsource IT was the reason for the failure of the IS. Companies that are planning to enter into IT outsourcing contracts need to seriously consider the following questions: why the company needs to utilize outsourcing and whether it will result in the success or failure of the IS in the company. Thus, a study of the impact of the extent of IT outsourcing on IS success measures is important for both researchers and practitioners.

IS service providers (including outsourcing vendors) deliver not only products but also the services associated with them. When IS users receive IS products from their service providers, they expect after-delivery services, such as training or help with using the providers' software. Thus, the users' systems are value-added by improving their service quality, and hence, the service quality is an

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http://dx.doi.org/10.1016/j.im.2013.12.002

important measure of IS success. In IS success models [16], the beliefs regarding the system quality, information quality, and service quality can impact user attitudes and behaviors, user satisfaction, the new systems' perceived usefulness (in the Seddon model (1997)), and IS use (in the D&M Model (1992)). IS outsourcing will impact these attitudes and behaviors through the service quality, and major outsourcing vendors attest to the close association between outsourcing performance and customer service [11]. In this research, we study IT outsourcing and IS service quality jointly to examine their impact on IS success measures; in particular, we consider ZOT-based (Zone of Tolerance-based) service quality measures, the perceived usefulness, and the user satisfaction. To this end, the following research questions are addressed in this study:

(i) What are the direct impacts of IT outsourcing on IS success measures of perceived usefulness and user satisfaction?
(ii) What are the effects of the IS service quality (in terms of Zone of Tolerance (ZOT) measures) on the IS success measures of perceived usefulness and user satisfaction?
(iii) What are the indirect impacts of IT outsourcing (mediated through the ZOT-based service quality) on the perceived usefulness and user satisfaction?

This paper offers the following contributions: first, we highlight a problem area that is worthy of additional study by demonstrating the importance of outsourcing and the service quality to IS success. The use of previous IS success models, i.e., the D&M models (1992, 2003), the Seddon model (1997), and the Rai et al. model [80] model, as guiding frameworks is a vital way to ground the study in the existing body of knowledge. Second, we draw on the logic of the expectancy-disconfirmation, agency, and transaction cost economic theories as the basis for postulating why outsourcing and service quality may work well with the IS success variables. Third, we use the SERVQUAL+ instrument (an improved version of the original SERVQUAL instrument) and ZOT measures that have been used by few IS researchers. Fourth, we develop a model where the service quality is constructed in a nomological network of relationships on which we theorize and test the effects of the service quality. Consequently, our research will shed some light on the well-known controversy between the direct measures and the gap measures of IS service quality in the nomological network of relationships among IS success, IT outsourcing, and ZOT-based service quality.

The paper begins with a relevant literature review of outsourcing, service quality, and IS success measures, which is followed by this research area's theoretical foundations. Then, we introduce the basic elements of our research model and derive hypotheses. Next, the research methodology, measurement issues, data collection, and analysis are described, which is followed by the results and a discussion of the findings. Finally, we present this research's limitations and offer avenues for future research.

2. Literature review

In this section, an attempt has been made to provide a brief overview of the research on IT outsourcing, IS service quality, and IS success.

2.1. IT outsourcing

Outsourcing has become a popular governance mechanism whereby IS services are provided by the external vendor either instead of or in addition to the services provided by the internal IT department. IT outsourcing has witnessed continued popularity, and the IT outsourcing market accounts for 67% of all global outsourcing deals [41]. Lacity et al. [57] have predicted that both the IT and business process outsourcing markets will continue to grow in all global markets (for example, China's market is projected to grow at 38% annually). However, Lacity et al. [56] argue that organizations should carefully select specific IS activities to outsource rather than outsource all IS activities. The outsourcing of IS activities can range between two extremes, namely, from total outsourcing to total insourcing. Instead of treating outsourcing as a dichotomous variable, it is perhaps advisable to treat it as a continuous variable, i.e., as a degree (percentage) of outsourcing activity, as the extent of outsourcing varies for each potential IS activity. Prime candidates for outsourcing include IS development and maintenance, system operation, telecommunication management, system planning and management, and end-user support [34].

Research on IT outsourcing has dealt with topics such as outsourcing decisions [75], client-vendor relationships Faisal and Banwet (2009), vendor issues [53], and the mitigation of outsourcing risks [26]. In addition, the IT outsourcing literature surveys cover analyses of outsourcing topics, methodologies, and authors [28].

IT outsourcing can have both positive and negative effects on the quality of IS services. The positive effects include the modernization of IT infrastructure, obtaining highly skilled human assets from the vendor, and savings in in-house IT expenses [54]. The negative effects include a vendor's inability to cope with changing user information needs, potential delays in service delivery, the loss of control over IT assets, the lack of vendor commitment, and slow implementations [4,51,3,32]. Some of the risks of IT outsourcing can be mitigated through proper governance mechanisms [7]. Enhanced performance from outsourced vendors can be attained when transactions are aligned with governance structures [94]. Self-enforcing safeguards (e.g., trust or financial hostages) are superior to third-party safeguards (e.g., legal contracts), and furthermore, informal self-enforcing safeguards (e.g., trust) are superior to formal self-enforcing safeguards (e.g., financial hostages) [20]. However, given the mixed results of outsourcing performance that have been reported in practice and in the literature [59], it is important to examine the influence of IS outsourcing on IS success.

2.2. IS service quality and ZOTs

The service quality is defined as the degree of discrepancy (the gap) between the customers' perceptions of the service performance and their service expectations. The instrument we utilize, which is known as SERVQUAL, measures the service quality in a broad spectrum of service sectors [73]. The SERVQUAL instrument has been previously validated and used in an IS context (e.g., [78,92]). This instrument employs 22 items grouped into five categories: tangibility, reliability, responsiveness, assurance, and empathy.

Although the use of a gap measure of the service quality has been critiqued (e.g., [89] and the direct measure of service quality with SERVPERF or service performance [13] is recommended, the relevance of SERVQUAL (or service quality) attributes to the measurement of IS success appears to have been generally accepted [47]. Kettinger et al. [50] empirically validated the importance of the perceived service quality (SERVPERF) in predicting the behavioral intentions of customers with respect to reusing IS services. There have also been concerns regarding SERVQUAL in marketing and IS with respect to the ambiguity of the variable "service expectations" and the dimensionality of the instrument.

To address these concerns, the single expectation measure has been conceptualized as two levels of expectation [96]: desired

Perceived Service Level →		Inadequate Service Zone	Service Adequacy= Perceived Service – Adequate Service
	Adequate Service Level	Acceptable Service Zone	
Perceived Service Level →			
	Desired Service Level		Service Superiority= Perceived Service – Desired Service
Perceived Service Level →		Superior Service Zone	

** The shaded portion is the zone of tolerance

Fig.1. The zone of tolerance.

service and adequate service (Fig. 1). A desired service expectation is a higher level of service that a customer expects to be delivered. If the customer does not receive the desired service level, he/she holds another, lower level of expectation called adequate service. Thus, adequate service is the minimum service level a customer expects, and it meets his/her basic needs. To capture these measures, an alternate service quality instrument SERVQUAL+ (21 items) was developed by Parasuraman et al. [74] using the dual expectation standards of adequate service and desired service. A zone of tolerance (ZOT) is the range between the desired service and the adequate service within which the services will meet customer demands [97]. With reference to ZOTs, two gap measures are defined: (1) service adequacy (the perceived service is adequate service) represents the service quality with respect to the minimum expected service level and (2) service superiority (the perceived service is the desired service) represents the service quality with respect to the desired service expectation. When the perceived service is within the acceptable zone, the service adequacy will be positive and the service superiority will be negative (Fig. 1).

While these dual expectation measures and ZOT have been studied in the non-IS context, there seem to be few studies that employ ZOT in the IS service-quality context (for example, [49,88] employed dual expectation measures). Kettinger and Lee [48] derived the IS ZOT instrument, which consists of 18 items in four dimensions (reliability, responsiveness, rapport, and tangibles) based on an Exploratory Factor Analysis. Tsai and Lu [88] applied the ZOT concept by incorporating fuzzy measures to the service quality of e-stores. Furthermore, Kettinger and Lee [49] recommend the use of dual expectation measures (adequate and desired) and a zone of tolerance for IS service quality by adopting the three-column format of SERVQUAL+.

Although service quality seems to be a broader concept that could be applicable to the entire set of services delivered by a service provider, it has direct implications for the IT applications used by individual users. For example, users who experience problems with their systems will still be able to use these systems if help services are provided reliably and on time. Similarly, users of a sales information system can utilize their updated hardware and software and thereby experience higher user satisfaction as a result of improved graphical user interfaces and layouts.

2.3. IS success

IS success is essential for realizing the value of IS within organizations. Thus, the measurement of IS success is important for assessing the effectiveness of IS governance and IS investments. A stream of research has been conducted in the past to identify IS success measures. DeLone and McLean (D&M) developed a model of "temporal and casual" interdependencies between six categories of IS success [15]. The constructs of the D&M success model include quality measures (information and system quality), attitudinal outcomes (use and satisfaction), and performance measures (individual and organizational impacts). Seddon [82] later suggested that use itself should not be treated as a measure of IS success, but rather as an observed consequence of success. Seddon [82] suggests that IS use is necessary (but not sufficient) to cause an impact in a process-model interpretation of *IS Success*. In a variance-model interpretation of *IS Success, IS Use* is excluded from IS success because "more *Use* may not mean more *Success*." Moreover, the *Perceived usefulness* is included in the re-specified model as an IS success measure and as an important predictor of future *IS use*. Based on their empirical results, Rai and Welker [80] amended the Seddon model by adding a path between the *perceived usefulness* and the *IS use*, which has improved the goodness-of-fit measures. Furthermore, two major modifications were suggested for the "updated" D&M (2003) model: (a) "service quality" was added to the model, and (b) the constructs of individual impacts and organizational impact were merged into "net benefits".

There have been several empirical studies related to IS success models [83,80,62,95,9]. Other empirical studies include the following: Wang and Liao (2008) applied the IS success model [16] to citizen (G2C) services and found most of the relationships to be valid in the eGovernment context in Taiwan. Lee et al. [58] validated IS success measures in the open source software environment, and they used them to find the determinants of open software success. Another study that validated the IS success model in eGovernment services was undertaken by Floropoulos et al. [22] for Greek Taxation Information systems; the researchers verified the validity of the model [16] in the tax-driven country in a mandatory use setting. Gorla [31] validated IS success models empirically by establishing the positive impact of the information, system, and service quality on organizational performance; furthermore, these authors showed that IS service quality is the most influential variable and that the IS-system-quality-to-information-quality link is a legitimate path in IS success models. The validity of the IS success models in various business and government contexts through a variety of empirical studies shows that IS success models are well accepted by IS scholars and are useful for practitioners.

There have been two principal studies of the meta-analyses of the prior empirical research on IS success models. One meta-analysis was performed by Sabherwal et al. [81] based on 121 previous studies published in the period 1980–2004 to determine the relationships among the standard IS success variables (namely, user satisfaction, system use, perceived usefulness, and system quality), user-related constructs, and context-based constructs. Based on a review of 180 articles related to IS success published in the period 1992–2007, Petter et al. [76] performed another meta-analysis on the relationships among the six constructs of the D&M model (2003), namely, information, systems, service quality, user satisfaction, system use, and net benefits.

In summary, the importance of the IS success topic in IS research is evident both from several surveys and meta-analytic articles on the subject [81,77] and by its wider application in different contexts, such as e-Government, e-commerce, and open source software [90,58].

3. Theoretical foundations

The theoretical foundation for this research includes the agency, transaction cost, and expectancy-disconfirmation theories. The Agency theory and Transaction Cost Economics are the most prominent theories that have been used to analyze outsourcing contracts [30]. Outsourcing gives rise to agency situations because the principal (the client firm) employs an agent (an external IS vendor) to do certain tasks (namely, IS functions). As per the Agency theory, there are two types of outsourcing risks from a client perspective in software development: pre-contract risk and post-contract risk [26]. Pre-contract risk is increased by adverse selection risk (the risk of choosing an unsuitable vendor). During the pre-contract period, the principal is not necessarily aware of the amount of effort or the level of expertise needed, nor is the ability of the agent to provide the required effort and expertise known. Nonetheless, post contract, the agent makes decisions on behalf of the principal [86]. The post contract risk is increased by the moral hazard risk, which is the result of the need to address hidden unsatisfactory vendor actions and performance [26]. Indeed, the agent can usually act in ways that are not directly observable by the principal.

The Transaction Cost Economics (TCE) theory has been applied in the IS literature to explain and predict outsourcing decisions and outcomes. There are several characteristics of a transaction (i.e., its asset specificity, uncertainty, and frequency) that determine the appropriate governance structure for it [94]. If the right decision is made regarding the governance structure (i.e., outsourcing or internal organization), then the transaction will be conducted in a cost-efficient manner. The asset specificity is deemed to be the most important dimension of a transaction [1]. Unlike an asset-specific transaction, a non-specific asset can readily be used in other activities. There are three types of asset specificities: site specificity, physical asset specificity, and human asset specificity [94]. Suppliers that are involved in asset-specific transactions will have a cost advantage over other bidders at the time of contract renewal, which results in opportunism. Another important characteristic of a transaction is uncertainty, which is of two types: behavioral uncertainty, which results from the distortion and disguise of information, and environmental uncertainty, which is due to bounded rationality (i.e., the unfeasibility of creating strategies for all possibilities in advance). These characteristics of transactions are relevant in the IT outsourcing context.

The expectation-disconfirmation theory, which is a popular approach in marketing, is useful in explaining the concepts of service quality and user satisfaction. As per the expectancy-disconfirmation paradigm, customer satisfaction depends on three variables: (1) expectations, (2) perceived performance, and (3) disconfirmation [65]. Consumers utilize prior purchasing experiences to form internal standards of comparison, which are then used to form their expectations [70]. Consumers' perceptions regarding how a product fulfills their needs, wants, and desires are defined as the *perceived performance*. In addition, *disconfirmations* are cognitive comparisons between predictive expectations (or desires, needs, and norms) and what the consumer actually received in terms of service [84].

A summary of the linkage between each of the above theories and the forthcoming hypotheses of this research is as follows: the hypotheses H1, H2, and H3 are related to the risks of outsourcing and address issues such as the service quality, the user satisfaction, and the perceived usefulness. Thus, they are explained by the Agency Theory and TCE. As H2, H4, and H6 address user satisfaction, these hypotheses can be linked to expectation-disconfirmation theory. The linkages are as follows:

Agency theory ⟶ H1, H2, H3

Transaction cost economics theory ⟶ H1, H2, H3

Expectation–disconfirmation theory ⟶ H2, H4, H6

4. The present study

The following points are the research gaps in the previous literature. First, few IS studies have used a more recent service quality instrument such as SERVQUAL+ in validating IS success models. Second, most of the empirical research on IS success models has used only the direct measure of service quality (the perceived service), not the gap measures (the perceived service minus the expectation). Previous researchers [74,48,43] attest to the superior diagnostic power of gap measures of service quality. Third, the service quality has been an important consideration when IS services are delivered by external service providers, as in IT outsourcing. Previous researchers have attested to the close association between outsourcing performance and service quality [11]. However, there has been little research on the application of ZOT measures in IS service quality research; the sole exception is the IS ZOT study by Kettinger and Lee [49]. However, their study does not consider ZOTs in the nomological network of IS success variables. In the current study, we use three types of service quality measures: the *perceived service* (a direct measure of the service quality), the *service adequacy* (the discrepancy between the perceived service and adequate service), and the *service superiority* (the discrepancy between the perceived service and the desired service).

This research study attempts to take a step forward from the previous research. We model and empirically examine the relationships among IT outsourcing, the ZOT-based IS service quality, and the IS success measures of perceived usefulness and user satisfaction. For this research, we used two (out of the five) IS success measures used in the Rai et al. model: the perceived usefulness and the user satisfaction. We did not include the information quality, system quality, or system dependence (IS use), as there is an overlap between the information and system quality and the user satisfaction. We chose to incorporate the user satisfaction because this datum is a widely used single measure of IS success in previous studies [15]. Previous research acknowledges the overlap between the user satisfaction and the information and system quality [80,24]. For example, the 12-item instrument developed by Doll and Torkzadeh to measure the end-user computer satisfaction (EUCS), which consists of the content, accuracy, format, timeliness, and ease of use, clearly overlaps with the measures of information and system quality. Whereas the ease of use and timeliness reflect the system quality, the content, accuracy, and format belong to the information quality. Gorla et al. [33] conclude that user satisfaction items and system and information quality items are not distinct items. We did not include IS use as a success measure in our research, as IS use in itself is not considered as a success measure; however, the impact of IS use is a success measure [82,9].

We consider the unit of analysis for our research to be "one or more information systems" engaged by a user based on the following rationale: whenever IS users are involved either directly or indirectly in IS development or the maintenance or operations related to certain ISs, and when they make use of services delivered by service providers, they note the quality of the services rendered to them, their perception of the usefulness of these ISs in their day-to-day jobs, and the resulting satisfaction. Thus, the above definition satisfies the requirements of this research. Seddon [82], p. 246, defines an "information system" implicit in the IS success model to be "... either some aspect of an application of information technology (IT), one individual application, a group of applications (including those of an entire organization), or an application of one type of IT." A user uses either one information system or multiple information systems. Pitt et al. [78] indicate that the unit of analysis for the service quality can be either an

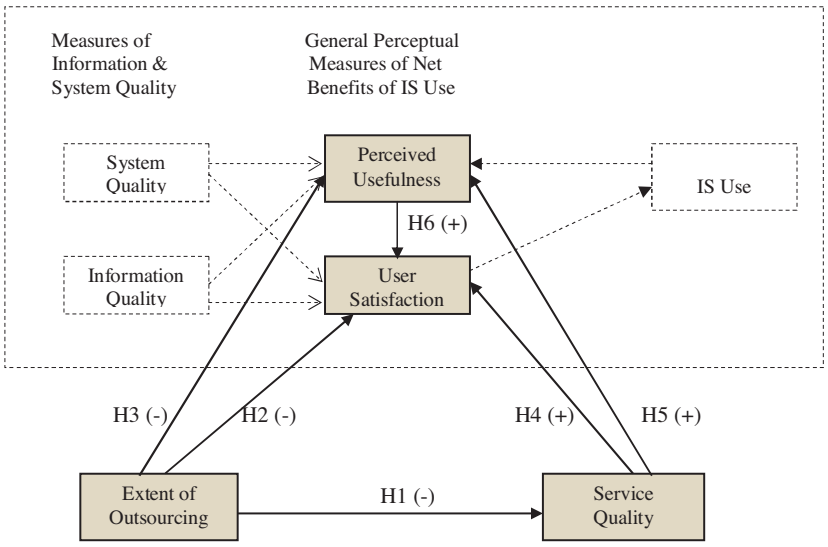

Fig. 2. The research model.

information system or the IS department as a whole and that the distinction is irrelevant for a user of multiple systems.

5. Research hypotheses

Fig. 2 shows our research model and the related hypotheses. Based on this model, we suggest that: (1) the extent of outsourcing has a direct impact on both the *perceived usefulness* and the *user satisfaction*, (2) the extent of outsourcing is directly related to the IS service quality, (3) the IS service quality is directly related to both the *perceived usefulness* and the *user satisfaction*, and (4) the extent of outsourcing has an indirect impact (through its effect on the IS service quality) on both the *perceived usefulness* and the *user satisfaction*.

In our research, we assume a volitional "IS use" environment, which is consistent with the DeLone and McLean [16] model. With the advent of advanced information technologies including end-user computing, graphical user interfaces, and electronic commerce, voluntary system use has become more common. Even if users are initially required to use the system, it is generally discontinued if they are dissatisfied with it.

5.1. The effect of the extent of outsourcing

The "extent of outsourcing" measures the degree to which external IS vendors provide various IS services to an organization. Although the set of activities could be both outsourced and insourced, predominantly outsourced activities prevail at higher levels of the "extent of outsourcing." Thus, the effects of the IS activities could be considered as the effects of the outsourced activities at the higher levels of the "extent of outsourcing." According to the resource-based view [66], superior performance could be achieved by organizations because of their usage of complementary resources from the outsourcing vendors. These complementary resources can take different forms, such as the possession of advanced technology, the technological expertise of the external provider, and experience with several similar projects by the provider.

However, users' dissatisfaction with outsourcing is often attributable to the external service provider's lack of commitment and their inability to precisely understand the users' information requirements [45]. As per the Agency Theory, because the principal and the agent are both motivated by self-interest and profit maximization, the agent may not act in the best interests of the principal [60]. Their conflicting goals result in a lower level of IS service quality and higher user dissatisfaction because the external service provider is less sensitive to the client's culture, tradition, and business strategies [11]. Although an agency situation may also arise between the IS department (the principal) and the users' departments (the client), there is less of a goal conflict with an internal department than with an external vendor, as both strive to maximize the same set of profits. Thus, IS outsourcing results in lower service quality and lower user satisfaction than in-house IT services.

Furthermore, according to the TCE theory [94,68], in high asset-specific transactions, the vendor makes specific investments in physical capital (e.g., specialized software) or human capital (e.g., the specialized technical skills of personnel) in the project. For example, IS development and maintenance is a highly asset-specific transaction, as it is more closely tied to a specific computing system [34] and organizational environment. This asset-specific transaction leads to an unbalanced relationship between the transacting parties because the supplier is "locked into" the transaction and the buyer cannot turn to alternate suppliers because of high supply costs [94]. Such a scenario gives rise to opportunistic behavior and unwillingness on the part of the vendor to make adequate investments in the project in the future [68]. Consequently, the systems designed by IS vendors may not precisely meet the information needs of the specific user (because it is cost beneficial to vendors to design systems that are general enough to cater to multiple clients [51], which can ultimately result in user dissatisfaction.

IS development activity is both a behaviorally and environmentally uncertain transaction. It is behaviorally uncertain because the supplier may not disclose critical information, such as their system's viability or their competence, which gives rise to opportunistic behavior. Moreover, this activity is an environmentally uncertain transaction because it is difficult to specify all of the possible scenarios in the contract owing to bounded rationality and the fact that the client's information requirements may change in the future. As per the TCE theory, these shortcomings result in incomplete contracts, which leads to opportunistic behavior on the part of the service provider [68] and ultimately results in many risks in IT outsourcing. Aubert et al. [4] report several risks of IS

outsourcing, including the delayed delivery of data and the slow implementation of IS/IT projects. Through empirical studies, other researchers [29,32] also confirm the risk components of IT outsourcing, such as the degradation of IS services and vendor attitude problems, that affect the service quality.

The extent of outsourcing impacts the IS service quality in terms of not only the perceived service but also the service's adequacy (the perceived service minus the adequate service expectation) and superiority (the perceived service minus the desired service expectation). It has been established that service expectations (the adequate service and desired service) are positively related to the perceived service [37]. If the service performance is lower than the service expectations of users, then the service provider will increase their performance to match these expectations. If services are delivered at a higher level than the initial expectations, then the expectations will be revised upwards. Additionally, in the case of outsourcing, the user expectations (the adequate service and desired service) from external vendors are higher than the expectations of in-house services. The result is decreased service adequacy and decreased service superiority with increased outsourcing.

H1. The extent of outsourcing negatively impacts the IS service quality (the perceived service, the service adequacy, and/or the service superiority).

H2. The extent of outsourcing negatively impacts user satisfaction.

The effect of IT outsourcing on the perceived usefulness can be justified. As per the Agency Theory (AT), two problems are faced by the principal [21,86]: (1) the hidden characteristic problem (which occurs before entering into the contract) and (2) the hidden action problem (which occurs after entering into the contract). These problems are also known as the adverse selection risk and the moral hazard risk, respectively Snir and Hitt (2004). It is a challenging task for the client firm to verify the quality of work performed by the outsourcing vendor at the outset, as monitoring the work behavior of professional jobs or knowledge-based IS activities is difficult [5]. Inasmuch as the IS vendor may not be skillful enough to perform the task at hand, may not be familiar with the business of the client because it is an external vendor [26], and may not act in the interests of the client firm, the resulting system may not be maximally useful with respect to the users' tasks. These risk factors of a lack of qualifications of the vendor's staff and vendor competence problems with IT outsourcing contracts have been shown empirically by other researchers [29,32].

Based on a transaction cost analysis, firms should have their transactions carried out by an external supplier when the asset specificity and measurement problems are low or the outcome uncertainty is low. However, with IS development activity the outcome uncertainty and asset specificity are high. Because these characteristics lead to opportunistic behavior on the part of the vendor Aubert et al., 1996, it is difficult to ensure that the vendor will provide the appropriate services that will result in useful outcomes for the client. IS vendors tend to reduce costs by offering similar products and services to multiple clients and may not be flexible enough to meet the needs of a specific client firm [51]. As a result, IS vendors may rely on their preferred technology in which they have the greatest expertise rather than the technology that best fits the client's business needs [71]. Such mismatched systems will affect the usefulness of IS outputs.

H3. The extent of outsourcing negatively impacts its perceived usefulness.

5.2. The effect of the IS service quality

The effect of the IS service quality on IS success measures may be explained using the expectancy-disconfirmation paradigm. Disconfirmation of IS users occurs when there is a gap in terms of their service expectations from IS service providers and the level of service they actually receive. If disconfirmation is perceived by a consumer, then the IS users' satisfaction increases or decreases accordingly. Thus, the service quality can be considered as an antecedent to consumer satisfaction [13]. Indeed, the service quality has been shown to impact consumers' satisfaction positively in online purchasing environments, which leads to repurchase intentions [98].

The relationship between satisfaction and the service quality can be described by Oliver [69] statement that "[satisfaction is a] summary psychological state resulting when the emotion surrounding discomforted expectations is coupled with the consumer's prior feelings about the consumption experience. . . .. satisfaction soon decays into one's overall attitude toward purchasing products". Kettinger and Lee [46] used the SERVQUAL instrument and found partial support for the relationship between the IS service quality and user satisfaction. The relationship between the IS service quality and user information satisfaction has been further confirmed by Jiang et al. [44], and furthermore, this relationship has been confirmed in open source software success by Lee et al. [58]. Similarly, the relationships between ZOT-based service quality measures (service adequacy and superiority) and IS user satisfaction hold true.

H4. The IS Service Quality (the perceived service, the service adequacy, and the service superiority) positively impacts User Satisfaction .

The functional departments periodically evaluate the IS department services [92] and rate them highly if their services contribute positively to their day-to-day functions. If the IS services are provided on time, the users tend to perceive the help to be more useful in their routine and decision-making tasks. In fact, the service quality is highly correlated with employee productivity improvement. Soteriou and Zenios [85] show a strong correlation between the operating efficiency of a bank branch and superior service quality within that branch. Users gain satisfaction based on the superior services delivered by the service provider, which leads to more use of the services and the realization of its benefits and consequently results in more efficiency and higher individual productivity improvement [40]. Similarly, high-quality services provided to IS users result in their improved productivity because of useful IS outputs. During the implementation of an expert system, Gefen and Keil [25] found that IS developer responsiveness to users' requests and feedback regarding system functionality (bugs and etc.) positively influenced the perceived usefulness of the system.

H5. The IS service quality (the perceived service, the service adequacy, and the service superiority) positively impacts its perceived usefulness.

5.3. The effect of the perceived usefulness

A useful system is expected to provide future benefits; to the extent that the system provides these benefits or does not provide them, a user is satisfied or dissatisfied [83]. The perceived usefulness, which is an attitudinal measure of the net benefits, impacts the user satisfaction; this effect is similar to the effect observed in TAM and TPB [82,80]. The lack of positive benefits (or usefulness) is likely to result in dissatisfaction and non-use of the

system [16]. Thus, increases or decreases of usefulness will lead to increases or decreases of user satisfaction with the information system.

H6. The perceived usefulness of a system positively impacts user satisfaction.

6. Measures

6.1. IS service quality

We adopted the SERVQUAL+ instrument [74] and modified it to suit the IS context. This instrument has 21 questions on IS service that are designed to cover the five constructs of tangibles, reliability, responsiveness, assurance, and empathy. The respondents were asked to give their impressions on each service quality item in three columns: "the minimum service performance level I consider adequate", "the desired service performance level", and "the perception of the actual service performance"; the respondents used a nine-point Likert scale (1 = a low service level to 9 = a high service level).

6.2. The extent of outsourcing

The source of the IS service provision was measured by five items: the development/maintenance of IS applications, system operations, telecommunications, end-user support, and IS planning Grover et al. (1994). The respondents were asked who provided specific IS functions to their departments using a seven-point scale (1 = a totally internal IS department, 7 = a totally external IS vendor). The extent of outsourcing is modeled as a reflective indicator rather than as a formative indicator[Ed30] .

6.3. The IS user satisfaction

The early research sought to establish a standard user satisfaction instrument [42,6]. Rather than indirectly interact with the computer through an analyst or programmer, users could now interact directly with the software. In response, Doll and Torkzadeh [18] developed a 12-item instrument intended to measure the end-user computer satisfaction (EUCS). This instrument, which is a synthesis of the [42] measure of user information satisfaction, is widely used, validated, and generalizable, and therefore, we adopted it to measure user satisfaction. It is a multifaceted construct consisting of 12 items classified into content, accuracy, format, timeliness, and ease of use.

6.4. The perceived usefulness

This measure has six items. Rai et al. [80] adopted a version of the Davis [14] instrument and modified it from its prior orientation towards the future to measure past usage. This instrument is used here to measure the perceived usefulness. Respondents indicated the extent of their agreement with statements such as "Using IS improves my job performance" along a seven-point scale (1 = extremely likely, 7 = extremely unlikely). This variable was reverse-coded prior to our statistical analyses.

7. Method

Data were collected from a nationwide survey drawn from the *Directory of Top Computer Executives.* The three-column-based SERVQUAL+ instrument [74] was modified to suit the IS context. We pre-tested the instrument with groups of academicians, industry professionals, and IS department personnel, and modifications were made accordingly. Introductory letters along with the modified SERVQUAL+ questionnaire were sent to the CIOs or other top-level executives requesting them to distribute these letters to their IS users. Thus, the questionnaire was delivered to 1500 prospective respondents in the USA, who were asked to assess the service quality of their Information System Function/Department. Ignoring the questionnaires that were returned unopened for various reasons, an overall response of 337 usable questionnaires representing about a 22.5% response rate was achieved.

Although this rate was a reasonable response for an unsolicited survey, common concerns of researchers are the rates of return on surveys and the possibility of nonresponse bias issues. Using an archival approach, comparisons of the total number of employees within the organization between respondents and nonrespondents did not differ substantively on this variable relevant to the survey. Specifically, the differences in the distributions of the employees were analyzed by cross-tabulation. The statistical significance was estimated by chi-squared tests, and a P value ≤ 0.05 was considered significant. The chi square test across the two groups revealed no significant bias ($\chi^2 = 10.492$, $\chi^{2.05}$, and 5df = 11.0705).

The largest group of respondents was from the manufacturing sector (25.8%) and had been with their companies for 3–5 years (the mode), had 6–10 years (the mode) of computer experience, and its members were 36–45 years (the mode) of age; 56% were males and 44% were females. The firms surveyed had 500–1000

Table 1
The characteristics of respondents.

The department the respondent works in		
	Frequency	Percent
Blank or missing	2	.6
Manufacturing	86	25.5
Marketing	9	2.7
Finance	61	18.1
Human resources	20	5.9
Headquarters	10	3.0
Accounting	26	7.7
Others	123	36.5
Total	337	100.0
The number of employees in the department		
	Frequency	Percent
Blank or missing	2	.6
Less than 10	84	24.9
10–25	87	25.8
25–50	82	24.3
50–100	50	14.8
More than 100	32	9.5
Total	337	100.0
Age		
	Frequency	Percent
Below 20 years	10	3.0
20–25 years	44	13.1
26–35 years	100	29.7
36–45 years	119	35.3
Above 45 years	64	19.0
Total	337	100.0
Years with the organization		
	Frequency	Percent
Blank or Missing	2	.6
1–2 years	67	19.9
3–5 years	88	26.1
6–10 years	78	23.1
11–15 years	50	14.8
More than 15 years	52	15.4
Total	337	100.0

(the mode again) employees, with the number of employees in a department being 10–25 (the mode). The respondent profile is presented in Table 1. The questionnaire contained multiple measurement items related to each of the constructs based on previous IS success models [15,16,82,80]. The scales we employed had demonstrated good psychometric properties in previous studies. Appendix B lists the questionnaire items used to measure each construct.

IS users were the most appropriate choice as survey respondents for our research. These users are generally aware of the outsourcing vendors' involvement with IS activities, as the vendors either meet the users' information needs or are provided feedback on their performance. Heckman [39] showed that most of the clients exhibit discretionary collaborative behavior with service providers, such as complementing their service/product or defending them in discussions with management. Furthermore, the client firm consistently recognizes the importance of interactions and facilitates communications (both formal and informal) between the vendor team and the user team in the post-contract operation [45]. The users are generally involved with service providers in the planning, analysis, design, testing, implementation, and maintenance stages. Sengupta and Zviran (1997) found that there was good communication or interaction between users and outsourcing vendors, who were present due to training programs and users' participation in system development activities. In addition, IS users are the receivers of IS services, and IS success measures are about the perceptions, attitudes, and behaviors of these users [80]. IS users have been used by previous researchers in empirical studies related to IS success measures [62,80], the service quality [44], and IS outsourcing [27].

8. Analyses and results

Structural Equation Modeling (SEM) was used to analyze the data. The observed data passed tests of univariate normality. All of the variables were examined for outliers and other departures from non-normality, and no significant outliers were detected. The skewness and kurtosis measures for all items were within the recommended limits of −2 to + 2, which indicated no serious departures from the normality assumption, and the standardized residuals among the scale items were well below the recommended threshold value of 3.0. Furthermore, Mardia's coefficient [63] provided an indication that the data were free from multivariate kurtoses. The observed sample size ($n = 337$) appeared adequate to test a full simultaneous measurement-and-path model [35]. The AMOS version 19 program for structural equation modeling is used as the analytical program for testing statistical assumptions and for estimating the confirmatory and structural models developed in this study.

8.1. Measurement models

To assess the strength of measurement between the items and their associated constructs, three measurement models (for the perceived service, the service's adequacy, and the service's superiority) are estimated. Fitting a Confirmatory Factor Analysis (CFA) model to each dataset tested the proposed research model. In the CFA model, each scale item was modeled as a reflective indicator of its hypothesized latent construct. The measurement model was tested using conventional maximum likelihood estimation, and we employed each model's correlation matrix as an input (Appendix A shows an example of the correlation matrix for the perceived service). Proper model identification was established because at least three items were used per construct, all of the residual terms were uncorrelated with the other terms, and the models were recursive.

Table 2
Herman's single factor method to assess common method biasness.

Model fit indices	Multi-factor	One-factor	Δ
Chi-square	425.979	770.387	344.408
Degree of freedom	203.000	209.000	6.000
chi-square/df	2.098	3.686	57.401

As many researchers note the need to present multiple fit criteria to rule out the measuring biases inherent in the various measures [35], we examined several fit measures. The indices include (1) the goodness of fit index (GFI); (2) the adjusted goodness of fit index (AGFI); the root mean square error of approximation (RMSEA); (3) the normed fit index (NFI); (4) the non-normed fit index (NNFI-Tucker-Lewis), and (5) chi-square values (χ^2, chi-square and chi-square normalized by degrees of freedom, or χ^2/df). These indices met or exceeded their respective common acceptance levels Chau, 1997.

Unidimensionality and convergent validity are defined as the existence of one construct underlying a set of dimensions. Unidimensionality in CFA is usually assessed by means of the values obtained in a set of measurement indicators. We observed that the item loadings and indicator reliability were considered high for all of the models, as recommended by Fornell and Larcker [23]. Examining the t-tests for the factor loadings let us assess the convergent validity of each model [2]. The significance of most of the models' parameter estimates indicates that the constructs possess acceptable convergent validity. Although the models' chi square values were not significant and were somewhat large, the normed fit index for all of the models was below the threshold of 5.0 [8], which suggests a strong fit relative to the degrees of freedom. Similar support is provided by the GFIs, which are above the cut-off of .90 for unidimensionality for each set of items. The adjusted chi-square is below the acceptable value of 5.0 for every model, and the factor loadings are at or above the .70 cutoff, which is normally considered acceptable. Overall, the fit indicators suggest that each scale captured a significant amount of variation in the constructs.

8.2. The structural equation model of the perceived service

Before testing our hypotheses, the common method bias (CMB) was assessed using a statistical method, namely, Herman's single factor test, which is widely used. In this test, all of the variables are subjected to exploratory factor analysis (EFA), and a CMB is assumed to exist if one factor accounts for the majority of the variance in the variables. i.e., if one factor surfaces from the unrotated factor solution and explains more than 50% of the variance. In this study, the variance explained by the largest single factor was found to be 32.66%, which is less than 50% [38].

Using only EFA allows researchers to provide an estimate based on the results, but it implies no direct test of the differences. Recently, researchers have started performing Harman's single factor test using confirmatory factor analysis (CFA), and they have found it to be more robust than earlier tests [12], p. 580. Using CFA is more robust because differences between the one-factor model versus the multifactor model can be tested via the chi-square difference test. Table 2 shows the model-fit statistics of the two models, and their differences suggest that the multifactor model is better than the single-factor model, i.e., CMB is absent in the present dataset.

Fig. 3 displays the results of the structural model with the perceived service as a measure of the service quality. Consistent with our hypothesis H1, the extent of outsourcing had a significantly negative effect on the service quality (the perceived service) at the .000 level of significance. Similarly, H2 is supported

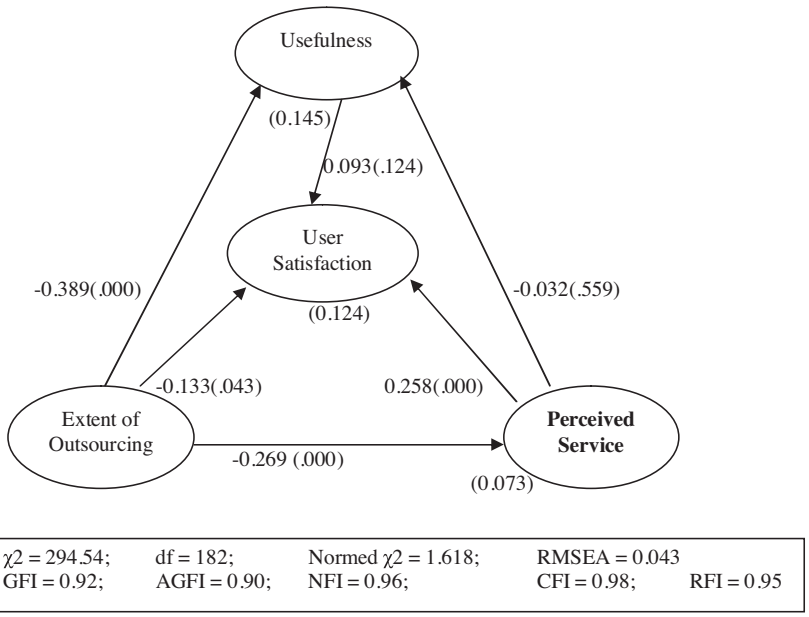

Fig. 3. The results of the research model with perceived service.

at the 0.05 level, as the extent of outsourcing was negatively related to the user satisfaction. Strong support for H3 was observed by the negative relationship between the extent of outsourcing and the perceived usefulness at the .000 level of significance. Although the service quality was significantly related to the user satisfaction (H4 was supported at the .000 level of significance), it was not related to the perceived usefulness; thus, H5 is not supported. Furthermore, H6 is not supported in the outsourcing context, as the perceived usefulness is generally not related to the user satisfaction. Thus, the first four hypotheses were supported at the .05 level of significance.

To determine whether the perceived service is mediating the relationship between the extent of outsourcing and the user satisfaction or the relationship between the extent of outsourcing and the IS system's usefulness, bootstrapping analyses were conducted using the methods described by Preacher and Hayes [79] for estimating the direct and indirect effects with multiple mediators. The user satisfaction and usefulness were entered as the criterion variables, the extent of outsourcing was entered as the predictor variable, and the perceived service was entered as the proposed mediator. As shown in Table 3, the bootstrap results indicated that the direct effect of the extent of outsourcing on the usefulness (direct effect = .380 and $p = .001$), the direct effect of the extent of outsourcing on the user satisfaction (the direct effect = −0.206 and $p = 0.002$), and the total effect of the usefulness on the user satisfaction (the total effect = −0.084 and $p = 0.272$) changed to the direct effect of the extent of outsourcing scores on the usefulness (the total effect = .389 and $p = .001$), the direct effect of the extent of outsourcing on the user satisfaction (the total effect = −0.133 and $p = 0.050$), and the direct effect of the usefulness on the user satisfaction (the total effect = −0.093 and $p = 0.164$) when the perceived service was included in the model (the direct effect of the extent of outsourcing on the perceived service = −0.269 and $p = 0.001$). Furthermore, the analyses revealed with 95% confidence that the total indirect effect (i.e., the difference between the total and direct effects) of the extent of outsourcing on the outcome variables (the usefulness and user satisfaction) through the mediator (the perceived service) was significant only for the satisfaction, with a path estimate of −0.105 (the p-value = 0.003). Thus, the perceived service did not mediate the association between the extent of outsourcing and the IS system's usefulness, but it partially mediated the association between the extent of outsourcing and the user satisfaction.

8.3. Other structural equation models

Table 4 shows the results of our hypotheses for the three structural models: the perceived service, service adequacy, and service superiority. All of the fit indices in the three models either met or exceeded the recommended levels. The standardized estimates of the models' path coefficients in the structural models were of greater interest, and the variance was explained (the R^2 value) in each dependent variable. Several hypothesized paths were supported at the .001 level, and others were supported at the .05 level. Of the five hypothesized paths in our research model, four paths for the perceived service and service superiority models and two paths for the service adequacy model were significant at $p < 0.05$ (with one path in the opposite direction), which provides reasonably good support for our hypotheses. Out of the three models, the perceived service and the service superiority models

Table 3
Mediation analysis.

Path	Without mediation			With mediation		
	Direct effect	Indirect effect	Total effect	Direct effect	Indirect effect	Total effect
EOS ⟶ USEFUL	0.380 (0.001)	–	0.380 (0.001)	0.389 (0.001)	−0.009 (0.596)	0.380 (0.001)
EOS ⟶ SAT	−0.206 (0.002)	−0.032 (0.296)	−0.238 (0.001)	−0.133 (0.050)	−0.105 (0.003)	−0.238 (0.001)
USEFUL ⟶ SAT	−0.084 (0.272)	–	−0.084 (0.272)	−0.093 (0.164)	–	−0.093 (0.164)
EOS ⟶ PS	–	–	–	0.269 (0.001)	–	0.269 (0.001)
PS ⟶ USEFUL	–	–	–	0.032 (0.642)	–	0.032 (0.642)
PS ⟶ SAT	–	–	–	0.258 (0.001)	−0.003 (0.402)	0.255 (0.001)

Table 4
Summary of the hypothesis tests.

Hypothesis	support (Yes √; No X)	support (Yes √; No X)	support (Yes √; No X)
	Perceived Service	Service Adequacy	Service Superiority
H1	EOS ⟶ SERVQUAL √ −	EOS ⟶ SERVQUAL X	EOS ⟶ SERVQUAL X
H2	EOS ⟶ USAT √−	EOS ⟶ USAT √−	EOS ⟶ USAT √−
H3	EOS ⟶ USEFUL √−	EOS ⟶ USEFUL √−	EOS ⟶ USEFUL √−
H4	SERVQUAL ⟶ USAT √+	SERVQUAL ⟶ USAT X	SERVQUAL ⟶ USAT √ +
H5	SERVQUAL ⟶ USEFUL X	SERVQUAL ⟶ USEFUL X	SERVQUAL ⟶ USEFUL √−
H6	USEFUL ⟶ USAT X	USEFUL ⟶ USAT √ +*	USEFUL ⟶ USAT X
Fit Index	GFI: 0.92 AGFI: 0.90 RMSEA: 0.043 Normed χ^2: 1.618	GFI: 0.90 AGFI: 0.88 RMSEA: 0.053 Normed χ^2: 1.952	GFI: 0.92 AGFI: 0.90 RMSEA: 0.041 Normed χ^2: 1.558

EOS-Extent of Outsourcing; USAGE-Usage; USAT-User Satisfaction; SERVQUAL-ServiceQuality; USEFUL-Usefulness. The support for a positive relationship (√+); the support for a negative relationship (√−) was at the $p \leq .05$ level. The support for a positive relationship (√+*) was at the $p \leq .10$ level

exhibit better goodness-of-fit and support for our hypotheses than the service adequacy model.

9. Discussion

The primary objective of our research is to assess the impact of outsourcing on IS success. Our study provides both theoretical and empirical support for the influence of outsourcing and the service quality on the IS success measures. The empirical results are statistically significant.

9.1. The effect of the extent of outsourcing

Although outsourcing has been growing at a rapid pace [64], our empirical results demonstrate some negative effects of it. Our results are consistent with other researchers' and practitioners' observations [87,3].

Hypothesis H1, which suggests that the extent of outsourcing has a negative impact on the service quality, is supported in the perceived service model but not in the service adequacy and service superiority models. The finding that outsourcing is associated with poor delivered service is consistent with the reported experiences in industry. In one instance, low service quality was experienced when Dell, Inc. outsourced its technical support overseas because of language accent problems faced by US-based customers [3]. As our results indicate, a higher proportion of IT outsourcing (hence, a lower proportion of insourcing) are associated with poorer services delivered (lower perceived service). Artunian [3] states that the reason for poor service quality in IT outsourcing can also be attributed to the absence of both service-level agreements built into the relevant contracts and the appropriate penalties for not meeting these service levels. The performance of Application Service Providers (ASP) was found to be influenced by the users' expectations of ASP services [87]; this type of association could be a reason for the non-significant result for H1 in the cases of service adequacy (the perceived service vs. adequate service) and service superiority (the perceived service vs. the desired service).

The outsourcing of different IS activities will have different service quality impacts. For example, the service quality in the case of IS development and maintenance may be impacted by external vendors not paying much attention to the new information needs of the users. In the case of end-user support, the service provider may not be patient enough to listen to the smaller problems of the users and may thereby create disappointment in them. For telecommunication management, the service provider could be insensitive to the complaints of the users regarding service interruptions.

Hypothesis H2, which relates the extent of outsourcing to the user satisfaction, is strongly supported in all three of the models. The extent of outsourcing is negatively related to the user satisfaction. Although a primary reason for IT outsourcing is cost savings, the reduction of costs has not been substantial because of the additional expenditures needed to manage contracts and vendor relationships [64], which results in dissatisfied customers. In another instance, J.P. Morgan has decided not to renew its $5 billion outsourcing contract with IBM; it has chosen instead to insource its IT functions [52]. Thus, our results are in agreement with IS outsourcing experiences in practice.

Hypothesis H3, which suggests a negative impact of outsourcing on the perceived usefulness, is strongly supported by all of the service measures (the perceived service, service adequacy, and service superiority). This result is in agreement with previous studies, where it was found that the business familiarity of an IT service provider will reduce the outsourcing risks and increase the outsourcing performance [26]. As external vendors are expected to have less familiarity with a company's business compared to internal service providers, IS success (in terms of perceived usefulness) is lower with increased IT outsourcing.

9.2. The effect of the service quality

Hypotheses H4 and H5 relate the influence of the IS service quality to the employed IS success measures. As expected, Hypothesis H4, which positively relates the service quality to the user satisfaction, is supported for the models of the perceived service and service superiority, but not for the service adequacy model. Our results are consistent with [46], who found that three of the five dimensions of the service quality are strong predictors of user satisfaction. Furthermore, our results show that the service quality partially mediates the relation between the extent of outsourcing and the satisfaction; this mediation is also evident from the strong positive relationship between the service quality and the user satisfaction. Our results are in agreement with the observation of Artunian [3] that overblown expectations are one of the seven failure factors of outsourcing. For example, a large European manufacturer selected a quality vendor with unrealistic expectations of high cost reductions, which has resulted in poor service delivery by the vendor, and hence, to dissatisfaction and discontinuation of the outsourcing project.

Hypothesis H5, which relates the service quality to the perceived usefulness, is not supported; rather, the relationship appears to run counter to this hypothesis in the service superiority model. A possible explanation could be that usefulness indicates individual benefits, such as improving users' productivity and effectiveness on the job. Indeed, their service quality has to do less with user productivity measures, whereas the information output and its quality are strongly related with users' productivity [80]; these factors are indicative of how useful the IS outputs are.

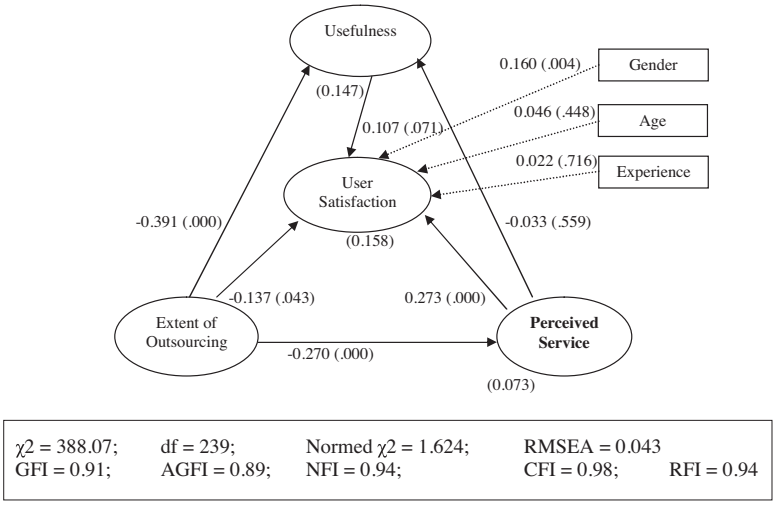

Fig. 4. The results of the research model of the perceived service controlled for gender, age and experience.

9.3. The effect of the perceived usefulness

Hypothesis H6, which relates the perceived usefulness to the user satisfaction, is not supported. Assuming the net benefits are equivalent to the perceived usefulness [82], our result is contrary to most empirical results, which indicate that the usefulness influences the user satisfaction and vice versa [76]. Thus, our results in the outsourcing context show that users will not be particularly satisfied because of the perceived benefits; on the contrary, other considerations are important. In addition to the service quality, the relationship quality is an important determinant that impacts the user satisfaction in outsourcing contexts [10]. The attributes of the relationship quality include trust, commitment, cultural similarities, interdependence, and communication quality [34].

9.4. The effects of the control variables for age, gender and experience

To control for the influence of external variables, and particularly demographic variables, our study has tested the gender, age and experience as control variables. For this purpose, a separate structural model with additional independent control variables (gender, age and experience) was estimated. The research model (of the perceived service) with control variables is shown in Fig. 4. Following the recommendation of Hair et al. [36], a comparison of model-fits suggests that the model with the control variables is not significantly different ($\Delta\chi^2 = 93.53$, $\Delta df = 57$, $\Delta\chi^2/\Delta df = 1.64 < 3.96$) from the model without these control variables. Indeed, the path coefficients show that only gender had a significant impact on the user satisfaction, i.e., gender was an independent predictor of user satisfaction. The other hypothesized relationships (H1–H6) remain unchanged. This finding is in parallel to previous research, which suggests that gender has a direct impact on technology-related job satisfaction [67]. However, age and experience did not have any direct effect on user satisfaction, which indicates that the findings (H1–H6) of this study would be same even after controlling for users' ages and their experience with computers.

A similar procedure was followed for two other alternative research models where the service superiority and service adequacy, respectively, had an effect on the dependent variable of user satisfaction. Again, the inclusion of control variables (age, gender, and experience) did not affect the main effects, and only gender had a significant effect on the user satisfaction. The model fit statistics and path coefficients for both alternative models are reported in Appendix C .

9.5. The implications of our work in practice

Our results show that the service quality is positively related to the user satisfaction. By improving the service level and/or by decreasing the expected service level, IS service providers (whether internal or external) can satisfy their users and make their IS functions successful. The service function can be improved by providing an adequate budget for training programs, establishing procedures for regular communications with users, implementing procedures to ensure the reliability of services [92], retaining knowledgeable IS staff, and providing adequate helpdesk hours.

Despite the negative effects of IS outsourcing demonstrated in our research, positive effects can be realized in practice by employing appropriate governance mechanisms [20]. One of the reasons for the negative effects of outsourcing is the insufficient employment of such governance mechanisms by firms. Different IS activities may need different safeguards because of the differing asset specificities and environmental uncertainties associated with outsourcing. For IS development and maintenance activities, because of the intrinsically higher asset specificity and uncertainty, informal safeguards (e.g., trust) will provide greater flexibility, whereas formal safeguards (e.g., financial linkages) may be employed for end-user support, telecommunications management, and system operations. Another governing mechanism that could be used in IT outsourcing is the contract type (Fixed Price or Time & Materials), which plays an important role in the quality of service provided by the vendor [30].

To mitigate the risks of outsourcing, managers may consider the following actions [52,3]:

- redesigning workflows and dividing work among multiple vendors,
- ensuring that both the vendor and the client follow their obligations and promises as incorporated in the legal contracts,
- maintaining a high-quality partnership with the vendor through participation, information sharing and communication,
- preparing a detailed contract specification including day-to-day responsibilities,
- selecting the vendor based not just on cost but also on the value to the business,

- retaining strategic planning and architecture design in-house,
- defining the service levels and the penalties for missed service.

It needs to be noted that increased business familiarity by the vendor mitigates the risks of adverse selection and moral hazards in software development outsourcing [26]. Long-term contracts and repeat contracts increase both the business knowledge of the vendor and the mutual trust between the outsourcing vendor and client.

9.6. Limitations and implications for future research

The present study has the following limitations, from which further opportunities for future research are presented. First, because our study addresses the effects of IT outsourcing from the client's viewpoint, it study may be repeated from the vendor's perspective. From this perspective, pre-contract risk exists because of insufficient knowledge and experience of the client with outsourcing contracts and the project, which can lead to project failures and a poor service quality delivered by the vendor. The post-contract risk exists in terms of a client's hidden behavior, such as non-cooperation and communication problems [26]. These post-contract risks also result in the vendor not being able to deliver quality services, which causes IS failures.

Second, our results show that the extent of outsourcing is negatively related to the service quality. The present study does not consider other factors of outsourcing performance, such as environmental uncertainty, partnerships between the outsourcing vendor and client, information asymmetry between the vendor and client, and outsourcing governance arrangements. Some of these variables may mitigate the outsourcing risk. The current study can be extended by including these additional variables, and the resulting integrated models can be tested empirically. Nevertheless, our research presents evidence of a strong relationship between the extent of outsourcing and the service quality.

Third, one method for assessing whether a direct or gap measure is a better choice for the IS service quality is to evaluate the fit among the nomological network of relationships with IS success measures. Our results show that the fit indices are the best with the Service Superiority (RMSEA=.041), which is followed by the Perceived Service (RMSEA = .043) and the Service Adequacy (RMSEA=.053). Because of the marginal differences among the service quality measures in their fit with success models, the choice of the service quality measure can be made based on the purpose of the study. For diagnostic purposes, the Service Superiority gap measures may be used, whereas for direct performance measurement, the Perceived Service may be used. "Desired service" expectations play an important role in the service quality of outsourcing projects, as evidenced by the best fit of Service Superiority. This fact is understandable because users' expectations from external vendors are much higher compared to those from internal sources. Future research may be directed towards designing scales for "Desired service" and Service Superiority because of their significance in outsourcing contexts.

Fourth, in this research we examined outsourcing at a gross level (i.e., the total score for all of the IS activities that may be insourced/outsourced). Each activity could have a different impact on the IS success measures. For example, with new IS development activity, the initial user satisfaction may be lower than the user satisfaction at later stages because of higher or lower perceived usefulness of the system. Thus, the model can be retested for different outsourced activities with different maturity levels to determine the impact on IS success. As the outsourcing relationship continues and a long-term relationship is built between the firm and the vendor, increased trust and satisfaction are likely to occur. Furthermore, the outsourcing vendor becomes more familiar with the business of the organization, thereby mitigating the risks of outsourcing [26] and increasing IS success through its usefulness.

Fifth, we used the total score for all six IS activities to arrive at our measure of the extent of outsourcing. Different weights may be assigned to each activity depending upon their importance to the organization, and we can thereby arrive at a weighted score. This type of model could be another extension of the present research.

9.7. Towards an integrated model

The fit indices suggest a good fit for our integrated research model (GFI = 0.92–0.90, AGFI = 0.88–0.90) in which outsourcing and the service quality have been integrated into IS success measures. All three ZOT-based service quality models (for the perceived service, service adequacy, and service superiority) meet the minimum requirements (AGI = 0.90; AGFI = 0.80) needed for IS research Segars and Grover, 1993.

Our integrated research model (Fig. 2) shows four out of six hypothesized paths as significant. The IS success models show more robustness, as evidenced by good fit indices with the integration of the extent of outsourcing and the service quality. Our integrated model obtained comparable fit-indices for each of the models (the perceived service, service adequacy, and service superiority) to those of the model of Sabherwal et al. [80]. However, the disparities can be attributed to differences in the data sample, difference in the measures, or the addition of both outsourcing and the service quality to the model. We obtained several stronger path coefficients, and we show that the IS service quality has a low SMC of 0.073 for the perceived service quality. This low score occurs because service quality is determined by not only how many IS applications have been outsourced but also by other variables such as the partnership type, top management support, cultural fit, and the experience of the providers. Our results demonstrate the legitimacy of the variables for the extent of outsourcing and ZOT-based service quality measures as antecedents to the IS success models. Hence, future research efforts can be undertaken to fully re-test the integrated IS success model.

10. Conclusions

This work makes a theoretical contribution to the field by evaluating the effects of IT outsourcing on IS success based on previous IS success models. We advance IS success research by investigating the effects of outsourcing and the service quality of IS successes using the expectations-disconfirmation paradigm, agency theory, and transaction cost economics. This research contributes to the scholarly debate on direct measures versus gap measures of the service quality, as the service quality is used in the network of relationships among the extent of outsourcing and the IS success measures. Our research provides further credibility to and validation of the ZOT-based service quality measures for use in IS success models and for measuring the IS service quality.

We have demonstrated theoretically and empirically the risks of IS outsourcing, which are in agreement with several outsourcing experiences in industry. Understandably, there are also several reports of positive experiences of IS outsourcing [11]. The benefits achievable with outsourcing are better understood using a relational view of organizations [19,20], which suggests that inter-organizational competitive advantages are found in inter-firm resources. The capital investments made specifically for an IS application in terms of special hardware and software can result in an efficient and user-friendly system that meets specific users' requirements.

Acknowledgements

We thank the AE and the reviewers for their valuable comments.

Appendix A. : An example correlation matrix.

Correlations for Perceived Service																				
	USFL1	USFL2	USFL3	USFL4	USFL5	USFL6	SAT1	SAT2	SAT3	SAT5	TAN	REL	RES	ASS	EMP	EOS1	EOS2	EOS3	EOS4	EOS5
N	337	337	337	337	337	337	337	337	337	337	337	337	337	337	337	337	337	337	337	337
USFL1	1.00																			
USFL2	0.89	1.00																		
USFL3	0.85	0.88	1.00																	
USFL4	0.86	0.89	0.90	1.00																
USFL5	0.86	0.88	0.89	0.91	1.00															
USFL6	0.88	0.90	0.86	0.89	0.90	1.00														
SAT1	-0.14	-0.17	-0.16	-0.15	-0.17	-0.17	1.00													
SAT2	-0.14	-0.15	-0.15	-0.16	-0.13	-0.14	0.71	1.00												
SAT3	-0.08	-0.11	-0.09	-0.10	-0.09	-0.08	0.74	0.65	1.00											
SAT5	-0.09	-0.10	-0.08	-0.09	-0.08	-0.09	0.66	0.63	0.68	1.00										
TAN	0.02	-0.02	-0.06	-0.05	-0.01	-0.02	0.18	0.14	0.19	0.16	1.00									
REL	-0.03	-0.04	-0.08	-0.08	-0.06	-0.04	0.23	0.23	0.21	0.20	0.68	1.00								
RES	-0.02	-0.05	-0.08	-0.08	-0.08	-0.07	0.25	0.22	0.26	0.20	0.69	0.81	1.00							
ASS	-0.05	-0.06	-0.08	-0.06	-0.05	-0.07	0.26	0.19	0.22	0.20	0.69	0.74	0.76	1.00						
EMP	-0.03	-0.07	-0.10	-0.08	-0.07	-0.08	0.25	0.18	0.21	0.17	0.68	0.72	0.76	0.77	1.00					
EOS1	0.17	0.18	0.18	0.17	0.20	0.19	-0.14	-0.03	-0.10	-0.07	-0.18	-0.19	-0.14	-0.13	-0.07	1.00				
EOS2	0.25	0.25	0.26	0.24	0.26	0.28	-0.18	-0.18	-0.15	-0.12	-0.25	-0.24	-0.24	-0.25	-0.20	0.70	1.00			
EOS3	0.32	0.32	0.32	0.30	0.31	0.32	-0.20	-0.17	-0.13	-0.15	-0.17	-0.18	-0.14	-0.23	-0.17	0.48	0.66	1.00		
EOS4	0.26	0.27	0.27	0.26	0.27	0.28	-0.15	-0.12	-0.13	-0.11	-0.20	-0.21	-0.15	-0.21	-0.16	0.59	0.68	0.60	1.00	
EOS5	0.27	0.27	0.31	0.26	0.27	0.29	-0.19	-0.21	-0.16	-0.18	-0.21	-0.19	-0.16	-0.23	-0.20	0.47	0.67	0.69	0.66	1.00
EOS6	0.34	0.35	0.34	0.33	0.35	0.38	-0.19	-0.13	-0.18	-0.11	-0.17	-0.15	-0.16	-0.15	-0.13	0.58	0.62	0.57	0.64	0.67

Appendix B: Questionnaire items.

Extent of outsourcing	Development of new IS applications
(1 = totally internal IS dept., 7 = totally external IS vendor)	Maintenance of existing IS applications System operations, including day-to-day data processing operations Telecommunications management and maintenance End-user support including help desk services IS planning and management

User satisfaction	Does the system provide the precise information you need?
(1 = almost never, 5 = almost always)	Does the information content meet your needs? Does the system provide reports that seem to be almost exactly what you need? Does the system provide sufficient information? Is the system accurate? Are you satisfied with the accuracy of the system? Do you think the output is presented in a useful format? Is the information clear? Is the system user-friendly? Is the system easy to use? Do you obtain the information you need in a reasonable amount of time? Does the system provide up-to-date information?

Usefulness	Using IS in my job enables me to accomplish tasks more quickly?
(1 = extremely likely, 7 = extremely unlikely)	Using IS improves my job performance? Using IS in my job increases my productivity? Using IS enhances my effectiveness on the job? Using IS makes it easier to do my job? I find IS useful in my job?

- ***Information System Service Quality***

We would like to get your impressions about services as they relate to your minimum, desired and perceptions of service performance of your Information systems. Please think about three different levels of expectations given below.

For each of the following statements, please check one box in each column.

	My minimum service performance level I consider adequate is									*My desired service performance level is*									*My perception of actual service performance is*									
	Low								High	Low								High	Low								High	No Opinion
When it comes to…	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9	N
Up-to-date hardware and software																												
Appeal of physical facilities																												
Neat appearance of IS employees																												
Appearance of physical facilities in relation to services provided																												
Fulfillment of promises by IS units																												
Interest shown by IS units to solve users' problems																												
Dependability of IS units																												
Providing IS services at the time promised																												
IS staff insisting on error free records																												
Commitment of service delivery time																												
Prompt service to users																												
Willingness to help users																												
Availability of IS staff to respond to user requests																												
IS staff instilling confidence in users																												
Safe feeling of users in transactions with IS units																												
Courteous interactions with IS users																												
Knowledgeable IS employees																												
Individual attention to users																												
Operating hours convenient to users																												
Personal attention to users																												
IS units have users' best interest																												
IS staff understand users' needs																												

Appendix C. : Alternate research models with control variables.

(i) The research model with service superiority.

Path	Without control variables	With control variables
EOS ⟶ USEFUL	−0.382 (.000)	−0.384 (.000)
EOS ⟶ SAT	−0.199 (.002)	−0.206 (.002)
USEFUL ⟶ SAT	0.098 (.118)	0.114 (.067)
EOS ⟶ SS	−0.012 (.839)	−0.011 (.848)
SS ⟶ USEFUL	−0.135 (.012)	−0.135 (.012)
SS ⟶ SAT	0.090 (.129)	0.105 (.074)
GENDER ⟶ SAT	–	0.143 (.011)
AGE ⟶ SAT	–	0.050 (.421)
EXP ⟶ SAT	–	0.027 (.663)

Model fit statistics: $\chi^2 = 503.43$, df = 239, normed $\chi^2 = 2.106$, RMSEA = 0.057, GFI = 0.88, AGFI = 0.86, NFI = 0.92, CFI = 0.96, RFI = 0.91.

(ii) The research model with service adequacy.

Path	Without control variables	With control variables
EOS ⟶ USEFUL	−0.381 (.000)	−0.383 (.000)
EOS ⟶ SAT	−0.208 (.001)	−0.216 (.000)
USEFUL ⟶ SAT	0.080 (.199)	0.094 (.127)
EOS ⟶ SA	−0.013 (.829)	−0.013 (.824)
SA ⟶ USEFUL	−0.052 (.329)	−0.052 (.326)
SA ⟶ SAT	0.064 (.270)	0.046 (.428)
GENDER ⟶ SAT	–	0.129 (.023)
AGE ⟶ SAT	–	0.029 (.649)
EXP ⟶ SAT	–	0.027 (.672)

Model fit statistics: $\chi^2 = 460.25$, df = 239, normed $\chi^2 = 1.926$, RMSEA = 0.052, GFI = 0.90, AGFI = 0.87, NFI = 0.93, CFI = 0.97, RFI = 0.92

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