



Case studies in research

Using balanced scorecards for the evaluation of “Software-as-a-service”

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ABSTRACT

To overcome the problem of limited resources, increasing numbers of small- and medium-sized companies (SMEs) are adopting “Software-as-a-service” (Saas) as an efficient tool for IS implementation. The balanced scorecard (BSC) has been adopted by SMEs to evaluate Saas via four measures: learning and growth, internal business processes, customer performance, and financial performance. The survey results for 101 Software-as-a-service adopters indicate that learning and growth, internal business processes, and customer performance are causally related to financial performance. The results show that these four key elements for Saas success are interrelated, supporting the core premise of the BSC.

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1. Introduction

IS maintenance costs comprise a major portion (70%) of the total IS implementation costs. Companies choose to invest their resources and manpower in their core capability to provide products or services. The demand for IT outsourcing and the Software-as-a-service (Saas) model, which integrates network, hardware, and software, is increasing as IT sophistication itself increases [31].

Saas can be defined as applications and computer-based services delivered and managed from a remote center to multiple customers via the Internet or a VPN. Saas shares common themes with On-Demand Service [27]. There is a growing use of other related and advanced platform services, such as cloud computing, infrastructure-as-a-service (IaaS) and platform-as-a-service (PaaS), representing a large pool of usable resources, such as hardware and software, that are easily accessible via the Internet [11]. It is estimated that by 2013, the cloud market will have reached \$8.1 billion [3]. Industry leaders predict that revenues from cloud computing enterprises will grow to \$160 billion. Experts describe cloud computing as “an emerging IT development, deployment and delivery model, enabling real-time delivery of products, services and solutions over the Internet” [16].

These attempts at “utility computing” are taking off due to the availability of sufficient bandwidth for such services. Broadband communication has become cheap and plentiful enough for utilities to deliver computing services with the speed and reliability that businesses previously enjoyed from their local machines. Typical IaaS offerings include Amazon’s Elastic Compute Cloud (EC2) and Simple Storage Service (S3), Joyent’s Accelerator, and Rackspace’s Mosso. The possible reasons for adopting cloud computing include (1) avoiding capital expenditure in hardware, software, and IT support and (2) using the flexibility and scalability of IT resources. The major issues of cloud computing include integrity of services and data, confidentiality of corporate data, and reliability perceptions, to name a few [5,8].

The Saas provider acts as a mediator, mediating services between independent software vendors (ISVs). Saas customers do not possess, manage or maintain the applications, but only use them as final products by accessing services with IT support. While Saas is advantageous in that it reduces the repair costs of application-based construction and maintenance, the risk of data leakage becomes a major disadvantage because application servers are constructed by outside companies.

Saas is one type of ASP (application service provider service). After being introduced between 1998 and 1999, the ASP service market increased rapidly from 2000 to 2001 due to excessive expectations and ASP service provider mergers and acquisitions (M&A). While the number of customers and the market size are continuously growing, the growth rate is plateauing. As the ASP market worsens, it is essential to improve ASP planning and management, as it is now harder for many ASP providers to survive

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[10]. For ASP services to be successful, system and service qualities must be well prepared [32]. In small- and medium-sized companies (SMEs), both ASP service and information quality are significant factors in enhancing user satisfaction, trust, and the intention to use [38]. ASPs are said to have achieved considerable success with big businesses, but their success has been less notable with SME markets [1]. For example, lack of ASP customization options and concerns about financial stability, service reliability, and functional capability flexibility are problems for SMEs. For these reasons, SMEs are less likely to adopt ASP services than large companies, making it necessary to develop empirical studies to examine how specialized measures may be applied to SMEs.

Outcome assessment in the traditional field of business administration places excessive emphasis on financial performance measures [49]. Because it is impossible to assess an organization in a competitive environment based merely on financial performance, it is necessary to measure SaaS performance by using the balanced scorecard (BSC) approach, which balances leading and lagging indicators, as well as by using financial and non-financial measures [29]. To provide a balanced approach to the measurement of organizational performance, including sub-areas, such as knowledge management (KM), business processes, and financial performance, BSC measures four categories: learning and growth, internal business processes, customer performance, and financial performance. Small companies develop multiple scoreboards, each tailored to the strategy and goals of a specific subunit. To survive in today's global and volatile business environment, SMEs are using newer management systems, such as BSCs, to clarify their vision and strategy and to translate them into action [35].

BSCs also include a financial perspective because such a perspective can easily summarize previous financial activities and yield predictable economic outcomes. The financial perspective indicates whether a strategic operation contributed to net profit improvement. The customer category assesses the extent to which the target market was captured. The internal business processes category focuses on core processes aimed at customer satisfaction and at financial objective achievement. The learning and growth category assesses the construction of necessary long-term growth and improvement infrastructure [30].

BSCs have been used to measure the performance of a wide variety of businesses. For instance [71], demonstrated the application of BSCs at an institutional level in a collaborative effort to develop a performance measurement framework for the Food Research Institute (FRI). Withanachchi et al. [65] applied BSCs to evaluate an organizational development program (TQM) that was implemented at a tertiary-care public hospital. Moreo et al. [46] suggested that BSCs could be used by managers to quantify the environmental and financial impact of a company and to help environmental quality to stakeholders, including hospitality owners and stockholders. Smandek et al. [55] developed and implemented a BSC system for IP management to optimize licensing income generation, cut costs, and keep inventors' motivations high. Homburg et al. [24] tested and applied BSCs to marketing performance management to show the comprehensive relationship between a marketing performance measurement system and firm performance as conditional on marketing alignment and market-based knowledge. Taylor and Baines [60] applied BSCs to evaluate the performance management of higher education in terms of the formation, monitoring, and evaluation of strategy and policy, as well as issues of motivation.

While BSCs have been applied in various contexts, empirical studies on the application of BSCs to specific IT services, such as SaaS, are lacking. Further, while SMEs have difficulty rationalizing their operational practices and strategic processes, there is a dearth of comprehensive performance management system applications

by SMEs [18]. Despite the wide scope of BSC application as a decision-supporting instrument, cause-and-effect relationships and time-delayed elements between measures are still elusive [47]. While causal relationships among the four BSC measurements are the core focus of BSC, empirical studies (via the testing of causal relationships among categories) examining how well BSCs can be applied are almost nonexistent. This study intends to fill this gap. This study suggests some measures to evaluate SaaS and tests these measures using data collected from companies that have adopted SaaS. The discussion and implications are included in the study.

2. Theoretical background

2.1. ASP service evaluation models

The criteria considered for ASP service selection are credibility, appropriateness, and efficiency, which further includes "prior experience," "ASP service expectation," "perceived provider performance," and "expectation-disconfirmation."

Kern et al. [31] suggested six propositions based on resource dependency theory, resource-based theory, transaction cost theory, and agency theory. These propositions are as follows: (1) the use of an ASP service is a strategic decision to supplement necessary parts of IS; (2) ASP customer service depends heavily on the ASP service; (3) ASP service generally has a lower cost; (4) ASP service prices increase over time; (5) SMEs are more interested in ASP service than are large businesses; and (6) the suitability of an ASP service is determined by the capability of the customer and the variety of the ASP service. Kern et al. articulated specific characteristics derived from the relationship between ASP service providers and their customers.

This framework for measuring the SME benefits and risks of Internet-based applications is designed for companies that do not have any specific team or methodology for measuring proposed IT outsourcing. Currie [10] suggested five categories for measuring the risk and benefit of applications provided by an ASP service, including delivery and enablement, integration, management and operation, business transformation, and customer/vendor relationship. This framework provides a difference in viewpoint between ASPs and their customers regarding key performance indicators (KPIs) of ASP services. Susarla et al. [58] suggested that perceived provider performance has a positive impact on user satisfaction with an ASP. Further expectations about ASP services have a significant influence on any performance evaluation of ASPs.

Leam and Lee [37] proposed items for auditing and verifying the reliability of ASP service through a survey of 35 Korean companies. By using categories, including network, data center, application, and security and customer support, Leam and Lee evaluated three ASP vendors in Korea. Leam and Lee derived the ASP life cycle and auditing items based on the evaluation results. The items for auditing ASPs were classified by function and performance into 12 items, and the relative importance of those 12 items was investigated. The items for auditing an ASP focus on assessing usefulness, extensibility, and application usability. Zviran et al. [72] suggested that perceived usefulness is one of the factors affecting user satisfaction with enterprise resource planning (ERP) systems, which are typical examples of ASP services.

Kim et al. [33] identified three characteristics of ASPs that affect the satisfaction of ASP customers: stability, IT infrastructure, and service flexibility. Kim and Kim [32] suggested five characteristics of ASPs that affect ASP customer satisfaction: credibility, system currency, security, acceptability, and system support. Susarla et al. [59] used prior literature in transaction cost economics (TCE) to posit that the contract design for an ASP service should consider such factors as uncertainty in specifying service requirements,

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