

Management of Information Systems: Insights from Management Accounting Research

Neale G. O'Connor*

The University of Hong Kong
Pokfulam Road
HONG KONG
E-mail: acno@cityu.edu.hk

and

Maris G. Martinsons

City University of Hong Kong
83 Tat Chee Avenue
Kowloon Tong, Kowloon
HONG KONG
E-mail: mgmaris@cityu.edu.hk

* Corresponding author

May 13, 2006

Management of Information Systems: Insights from Management Accounting Research

Abstract

This paper seeks to advance our knowledge in key areas of information systems (IS) research by applying ideas and insights from accounting to improve our understanding of IS management. An integrative cost-benefit framework is proposed and used to examine four areas of research that are related to the management of an IS: chargeback, outsourcing, decision support, and business process re-engineering and improvement. The paper specifies how the accounting literature contributes significantly to each of the four areas of IS management research, and highlights key questions for further study.

KEYWORDS: information systems value, IT management, outsourcing, chargeback, decision support, business process re-engineering, business performance.

I. INTRODUCTION

Information systems must be managed at various levels. Enterprise level decisions primarily revolve around the allocation of resources to IS-related activities. Functional level IS decisions include where and when to apply IT, and whether new applications should be made or bought, either purchased off the shelf or developed through an outsourcing arrangement. A decision to “make” a new IT application internally will inevitably lead to the initiation of a project that must be managed.

Important issues that are related to each of the aforementioned decisions have been considered by both IS and accounting researchers. For example, a steady stream of IS research on outsourcing began to emerge after the landmark decision by Kodak to outsource its IS [59, 5]. Similarly, accounting research has examined the initial outsourcing decision [89, 99, 48]. However, the IS literature has inadequately addressed other research questions that pertain to the management of IT, many of them involving post-implementation decisions. This paper addresses these inadequacies directly by applying an accounting perspective to four specific research areas within the post-implementation realm: chargeback for IS services, post-contractual management of IS outsourcing, management decision support, and IT-enabled operational process improvement.¹

Research on each of these four areas has been published widely in major IS journals [92]. Decision support and process re-engineering affect the managerial and operational processes of an organization, respectively, while outsourcing has been identified as a major technological change that is affecting the IT organization. Meanwhile, the management of chargeback is critical to two

¹ These four areas are by no means an exhaustive list of areas in which accounting research has contributed. For example, researchers in the area of business value of IS investments can draw insights from accounting researchers application of event study methodology, which they commonly employ in capital markets research. Further, IS project management is another well researched area that shares theory and methods with the accounting research into the implementation of various technologies such as activity based costing, balanced scorecard and enterprise resource planning.

of the eight imperatives identified by [87] for the new IT organization—achieving strategic alignment and developing a high performance culture.

The four areas have also been examined frequently in the management accounting literature [62, 14]. Although these areas address different issues and have tended to be examined in isolation, they share a dependence on accounting measures. First, the measurement of costs and cost drivers underpins the use of chargeback, facilitates the decision to outsource and often helps in the control of the outsourcing relationship. Second, measurement systems that span the value chain (e.g. the balanced scorecard) are commonly used as part of a managerial decision support system. Such measures are also used for the purpose of controlling operational process change, because you can only manage and change what you can measure.

While the accounting perspective is relevant to many IS issues, the most recent advances in accounting research has focused on decision facilitating and management control issues *after* an IS has been implemented [43]. As a result, this paper aims to help researchers consider the role of accounting in managing: (i) the intangible aspect of IT projects (both inhouse and outsourced), which raises the problems of risk assessment, control, and coordination; (ii) the judgment and decision-making biases that are associated with using a DSS, and (iii) the authority and incentive structure of the firm, such that they complement operational process change.

The next section presents a conceptual framework, which is first used to review the overlap between IS and accounting research. We then consider each area in turn, to 1) summarize the IS literature, 2) specify how the accounting perspective can augment mainstream knowledge, and 3) identify key issues for further research.

II. CONCEPTUAL FRAMEWORK: ACCOUNTING COSTS/BENEFITS

Accounting scholars commonly believe that by more accurately attributing costs to products, services and customers, accounting can greatly improve the quality of information for operating decisions. Similarly, by more accurately attributing employee effort to organizational outcomes, accounting can improve the motivation and goal alignment of employees. Both of these roles are aimed at enhancing the management of IS. The success of these roles ultimately depends on what objects (e.g., costs, activities, or processes) are measured and how well they are measured. Typically, these measurements are translated into monetary terms to evaluate the costs and benefits of various decisions or activities.

To introduce and relate the four areas of IS, it is helpful to consider the process of IT application depicted in Figure 1. An organization must first decide to the extent to which it will develop and operate its own IS. It may decide to outsource some or all of these activities. The value of each choice is based primarily on (i) the net benefits of outsourcing—the economic contribution of IT less the costs of contracting and control—and (ii) the benefits of in-house IS less the initial implementation and ongoing management costs.

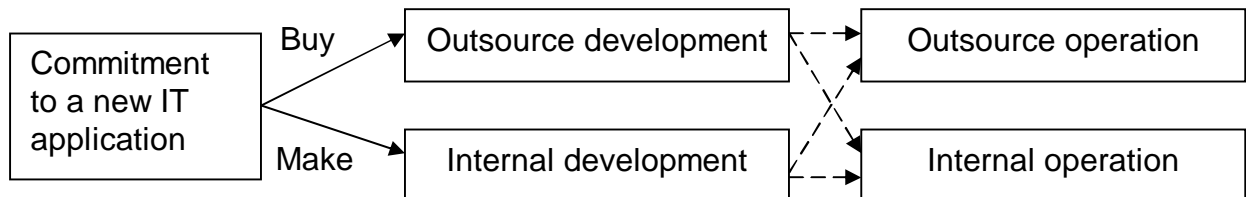


Figure 1 – The Process of IT Application

The economic benefits of IS generally take one of two forms: i) the reduction of operational costs through process improvement (by automating, streamlining or re-engineering capital and labor intensive activities) [35, 65], and ii) the improvement of resource allocation by providing more accurate and timely information to decision makers. The potential scope of IT application in an

organization ranges from the strategic level, where decisions concern the allocation of resources and the development of new ventures, to the operational level, where frontline workers can access information systems to make more accurate and timely decisions concerning suppliers, production, marketing and sales [66]. The cost/benefit framework in Figure 2 shows these two general types of IT benefits. It also depicts IT costs, which include: (i) initial development, which entails decisions about a combination of in-house programming and off the shelf software packages plus hardware acquisition versus outsourcing, and (ii) on-going maintenance costs, based upon a decision of whether or not to outsource IS operations. The core issues (questions) from an accounting perspective in each area of IS research are highlighted, because these issues drive the relevant part of IS design and thus ultimately affect the effectiveness of such design.

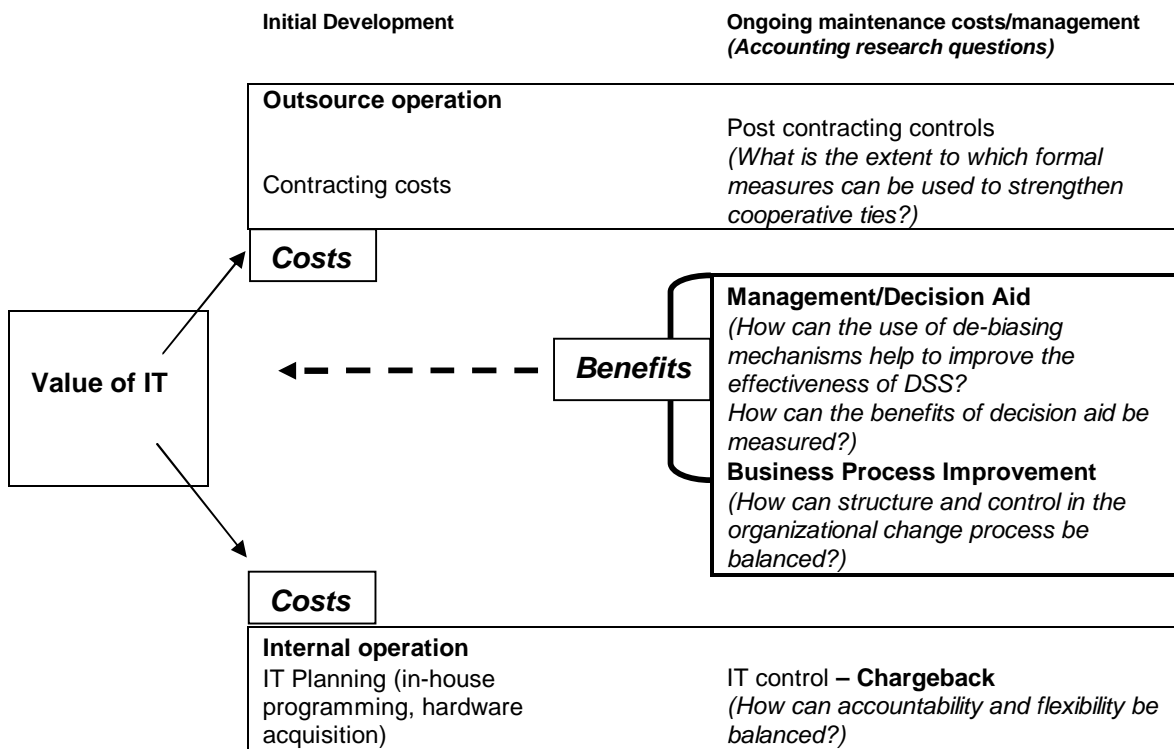


Figure 2: Cost/Benefit framework – with questions from an accounting perspective

III. FOUR AREAS OF INFORMATION SYSTEMS RESEARCH

MANAGING THE COSTS OF IS SYSTEMS

A significant concern for both IS researchers and managers is whether and how to recover the costs of operating and maintaining computer-based information systems. Within the IS literature, this has been defined as the “chargeback” issue [10, 71, 90]. A related issue is the outsourcing of an IS. Outsourcing decisions are important to IS researchers because, compared to other servicing processes (such as human resources and accounting), IT usually represents a larger share of an organization’s budget, and outsourcing provides an opportunity to leverage the core competence of another organization that specializes in IT services.

CHARGEBACK (INTERNAL TRANSFER PRICING)

A chargeback system traditionally bills cost centers or user departments for in-house IS services. There are several chargeback alternatives, such as cost minimization [23], flexible pricing—which was advocated to resolve peak load problems [30,101]—and the setting of standard rates based on the elapsed time, the estimated fraction of the system used by the job, and a time-adjusting factor that accounts for the job’s priority and mix in the system [94].

The rationale in most cases is to encourage the responsible and efficient use of IS resources, which has become more important with increasing technology investment and a growing diversity of users and uses. However, such a system inevitably raises the question of what terms and conditions should be applied. What chargeback system would be fair to both providers and users?

Several tradeoffs are depicted in Figure 3. According to Prendergast [86], chargeback helps to create a culture of *accountability* that communicates the cost of IT to users, who in turn act as independent monitoring devices. However, the demand for accountability may have to be tempered by a *flexible* approach that encourages volitional use that is critical to a firm’s strategy (see Figure 3). Finally,

can chargeback be used to match the *interdependency* between service department capacity and external (non-service) department demand?² For example, service department capacity will influence IS service cost, but it depends on external department demand. In an uncertain environment, the notion of IT capacity will constantly mirror changes in the interdependency between service and external departments. This in turn will influence the optimal cost levels for external departments and services.

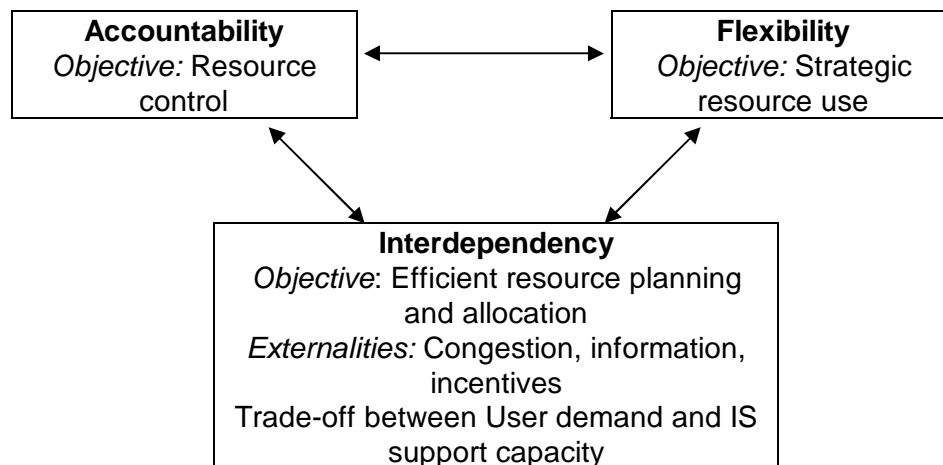


Figure 3. Drivers of chargeback design

IS researchers have actively examined various chargeback issues from the perspective of what determines chargeback practices. The drivers of chargeback have their roots in: (i) the management control philosophy, (ii) the strategic role of IT, and (iii) the organization's ability to measure costs and performance using other techniques. Although chargeback practices have not changed significantly, the difficulties of both allocating costs and effectively educating users about using chargeback information have increased steadily over time. Moreover, research into the role of chargeback between the two extremes of volitional use and control has yet to address issues of fairness, equity, responsibility, and controllability. These issues require new frameworks and instruments that go beyond those used in traditional IS effectiveness studies.

² Depending on the organization's information needs, service department capacity can relate to either service quality or information quality.

Chargeback studies from the 1980s may have limited relevance in today's IT-intensive business environment [108]. For example, the growing portability/mobility and declining cost-to-functionality ratio of IS hardware allows user departments to bypass the centralized IS department and purchase both hardware and software with their own budgets. The traditional IS service center is also imperiled as departments acquire their own IS specialists, while networking and maintenance services remain centralized. The organizational dispersion of IT resources reduces the central transparency of costs and IT resource consumption. The consequences of this are (i) understated IT costs and (ii) duplicated effort (multiple applications being run on multiple platforms). To address these developments, the charge out framework must be expanded to consider the IS budget setting process, IS performance management [67], and communication between IT providers and users to clarify their respective roles and responsibilities [109].

Similarly, the adoption of new technology involves user apprehension that is associated with the perceived benefits of use, steep learning curves, and uncertainty about the real costs of use. As IT adoption and upgrades take place at increasing rates, many organizations simultaneously have at least two generations of IT. As this increases the complexity of the chargeback system, Keller and Allen [49] suggest that a sound cost-benefit framework should be set up to identify the costs in question *before* the chargeout system is designed.

In short, researchers have yet to fully consider the dynamic and dispersed nature of IT applications, and have failed to view IS services as different from other services. The nature of IS services, being an inherent part of organizational structure and management, is such that complementarities and externalities are not fully considered.

Accounting perspective

Two accounting concepts provide guidance for designing and employing an IT chargeback system: *internal cost-resource utilization* within functional areas,

and the *effects of externalities* in the cost allocation process. Fairness in charging users for IT services is a commonly accepted principle [40]. However, putting this principle into practice can be difficult when organizational units are cross-connected. In such a case, IT use by one department will influence that of another department, and ultimately affect service department capacity. A poorly designed chargeback system will result in negative externalities, whereby costs will be imposed on other individuals without their participation in the decision. For example, Zimmerman [113] cites incentive effects, information effects, and congestion effects. *Incentive effects* arise because managers over-consume resources to the detriment of the firm's overall profitability. *Information effects* relate to the effect that charging systems have in establishing a mutual monitoring relationship which overcomes the problem of asymmetric information between users and suppliers. *Congestion effects* refer to the imposition of delays and rationing costs on other users within the organization. These result from the absence of chargeback, whereby no cost is placed on the use of limited resources.

The tradeoff between flexibility, which results in no self-monitoring and little concern for the resources that are consumed by the IT department, and accountability, can also stifle volitional use of IT services and resources. We identify three specific aspects within the chargeback area where accounting provides guidance for future research. They relate to (i) balance of control and volitional use, (ii) where strategic value (and thus a greater need for volitional use) is located, and (iii) the control mechanisms that will overcome the absence of chargeback-type accountability in these areas.

First, although it is logical to recoup the cost of IT investment according to a user-pays formula, the practical situation in which a balance is struck between accountability and flexibility is more complex for several reasons. It would thus be useful to have a better understanding of the extent to which minimum levels of chargeback act to increase user awareness of IT services. There appears to be a spectrum in which too little chargeback results in no self-monitoring by IT users and little concern for the resources consumed by the IT department, whereas too

much chargeback stifles the volitional use of the IT services and resources. How this balancing act between control and use is related to the economic value of IT is a question for future research.

Second, the accounting perspective acknowledges the need for volitional activity to be encouraged in strategic areas, such as research and development. However, this acknowledgement does not eliminate the need to evaluate and control the progress of a *strategic* project. The ability to determine a set of critical success factors for a strategic information system makes it appropriate to identify and monitor a few key financial measures that can indicate how well these critical success factors are being achieved while comparing the actual and expected costs of achieving important milestones [70]. This is consistent with the position of Rockness and Shields [88], who concluded that input and behavioral controls are appropriate when an organizational task involves a high degree of technological uncertainty or has outputs that are difficult to measure.

Third, it is important to recognize that chargeback systems are *not* the only means of guiding and controlling the actions of IS users. Research into non-chargeback systems can shed light on the effectiveness of chargeback. Research into how incentive systems that are tailored for the IS department and user departments can direct and motivate innovative behavior would be particularly useful. For example, Drake, Haka and Ravencroft [20] show that the interaction of the type of incentive system with cost allocation can affect profitability, productivity, innovation, and the exchange of information between parts of organizations.

The accountant's emphasis on economic measurement and value highlights the importance of using chargeback for strategic company-value purposes. Research into the linkages between the strategic objectives of IT use and the use of chargeback in enhancing this role would be of value. A key challenge for researchers is to understand and reconcile the chasm between two sets of conflicting views from practice: those advocating the use of chargeout for new information technologies [17, 82], and those criticizing it [27].

A final piece of the chargeback puzzle lies with the potential tradeoff between the encouragement of best IS support practices (i.e. minimal chargeback) and the decision to outsource, which is driven by gaps in information quality and IS support quality. Is an unsuccessful chargeback system a precursor to outsourcing? For these reasons, economists and accounting researchers recommend that there should be either no cost pricing or marginal cost pricing at the most [113, 38]. Research into the nature of IT use and the type of chargeback practices would also be helpful to determine the linkages between the chargeback and outsourcing of IS.

OUTSOURCING

Outsourcing involves the contracting out of all or part of a company's activities or projects to external parties. IS outsourcing decisions are characterized by their size, complexity, and potential irreversibility. The benefits of outsourcing IS activities include reduced costs due to the outsourcing vendor's economies of scale, immediate access to new technology and expertise, strategic flexibility, and avoiding the risk of obsolescence [68]. The complexity of IS outsourcing is characterized by its intangible nature, multiple stakeholders with varying objectives, and the delivery of the service over time. These factors highlight the need to consider the value of such services over several (including post-contractual) stages to evaluate their success or feasibility. In addition, the post-contractual stages require informal forms of governance that bring the contracting parties (which are initially at arms length) into a quasi-hierarchical cooperative relationship.

An extensive body of research on outsourcing in the IS literature dates back to Eastman Kodak's pioneering decision in 1989 to outsource its mainframe computers to IBM. Applegate and Montealagre [5] documented the effect of Eastern Kodak's decision in terms of the quality of processes and services, while Loh and Venkatraman [59, 60] found positive stock market reactions to outsourcing announcements. Subsequent IS research has found that the

determinants of successful outsourcing outcomes (such as quality processes and services) include the sharing of knowledge, having a detailed formal evaluation process, using shorter-term contracts, and outsourcing commodity IT on a selective basis [31, 52]. Lacity and Willcocks [54] identified 43 research articles that used a variety of methods to study IS outsourcing.

IS researchers have generally applied transaction cost economics to understand the rationales for outsourcing, such as the avoidance of obsolescence risk, access to new technology, and vendor economies of scale. However, IS research has inadequately accounted for the costs that are associated with the management and completion of IS outsourcing projects. The customer and supplier/stakeholder relationship that has been portrayed by applying transactions cost theory is an overly simplistic representation of a phenomenon made complex by: 1) the expectations of different stakeholders in outsourcing and 2) the existence of six outsourcing phases: scoping, evaluation, negotiation, and the transition, middle, and mature phases. Teng, Cheon and Grover [104] examined the relationships between several strategy-theoretic factors and the IS outsourcing decision. These factors include, gaps in information quality, IS support quality and IS cost effectiveness, and the strategic orientation of the firm. Their results strongly suggest that the outsourcing decision is a means of compensating for resource deficiencies. In contrast, neither cost considerations nor the firm's financial performance were found to significantly affect the outsourcing decision.

Outsourcing varies in terms of the degree of perceived client conflict in contracting relations, which is a result that can be explained with agency theory [36]. In applying agency theory to outsourcing, information asymmetry arises between the user and the supplier because of the supplier's expertise and the inability of the user to effectively monitor and control the project. Only recently have studies examined post-contract management as well as the middle and mature stages of the outsourcing lifecycle. For example, Lander et al. [55] and Lee [56] addressed trust and knowledge sharing issues, respectively.

Meanwhile, Miranda and Kavan [73] proposed a theoretical model of the governance requirements that are needed at different stages of the outsourcing model. Specifically, in contrast to the market/hierarchy decision that is associated with the initial decision to outsource (known as a promissory contract), they suggest that the governance of the outsourcing contract relies on the psychological contract and social capital, which have the aim of facilitating cooperation between the contracting parties (see Figure 4). This perspective provides a holistic understanding of “(1) when governance occurs; (2) what governance choices are available; and (3) what the consequences of governance choices are.” Miranda and Kavan used three theories (transactions costs theory, the embeddedness and knowledge-based perspectives) to model the processes and outcomes that are involved in the governance of IS outsourcing. They propose that an IS-specific theory of outsourcing is needed because of specific factors that “constrain and redefine the governance options available and the effects of governance choices.” Factors such as the mobility of time and space in today’s dynamic global environment may weaken the feasibility of the embeddedness perspective.

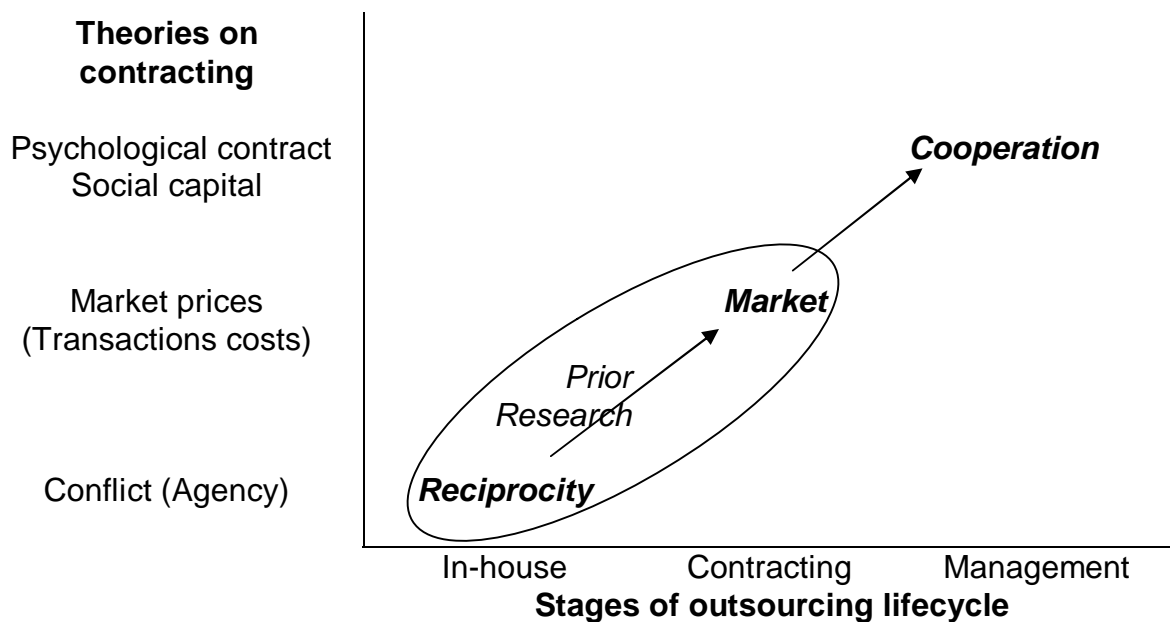


Figure 4. Outsourcing- Areas of prior research

Accounting perspective

Accounting researchers have made concerted efforts to understand the effectiveness of different control and coordination mechanisms in managing the post-contracting stages of outsourcing [75, 106, 78, 95, 11, 47, 96, 29]. Van der Meer-Kooistra and Vosselman [107] identified three different patterns of inter-firm relationship controls based on markets (arms length transactions), bureaucracies (formal rules and procedures), and trust (common values and maintaining reputations). Chalos and O'Connor [14] found that socialization and communication mechanisms were critical for knowledge and technology transfer within U.S.-Sino alliances. These two mechanisms are closely associated with bureaucratic and trust control patterns, respectively. Similarly, the notion of clan control has been proposed as important for cooperative coordination: for example, the use of boundary spanning workgroups, which cut across traditional business functions [81].

While the focus on the types of control mechanisms that are used and are effective in managing the outsourcing relationship has not been limited to the accounting domain, recent research has focused on the specific role of accounting in providing (relational) signals about the behavior of each contracting party [107]. Accounting measures provide formal information about each party's actions that helps to keep each party honest, and in so doing preserves the strength of relational ties between the contracting parties. The objective is for the parties to the relationship to openly share their knowledge and information.

Another stream of accounting research has examined the different contexts in which certain types of networks are formed, and then uses this as a basis for explaining the determinants of the usefulness of different types of controls [34]. For example, the type of network determines the amount and type of information that each party has about each other that contributes to the common understanding and stability of the relationship.

Researchers could compare cooperative relationships in a dyadic format with those in a network format, where there are simultaneous connections to other

business entities, such as the firm's customers. For example, a bank may retain its fiduciary responsibilities to customers even though they access an online banking site that is operated entirely by the bank's outsourcing agent. This type of relationship is likely to impose greater demands on the supply of information concerning the delivery on an outsourcing contract, which in turn, may drive the types of accounting controls required to maintain the outsourcing relationship [4].

MANAGING THE BENEFITS OF INFORMATION SYSTEMS

As mentioned earlier, an accounting measurement system provides information to influence decisions through mechanisms like chargeback and to facilitate decisions such as allowing managers to compute the costs and benefits of outsourcing. The provision of measures to facilitate and influence decisions extends to other areas of IS practice: decision support (at the management level) and process improvement (at the operational level). The planning and development of these types of IS have benefited from the literature on IS success, and particularly the models proposed by Delone and McLean [18] and Seddon [97], which have been widely accepted by academics and practitioners.

DECISION SUPPORT SYSTEMS (MANAGEMENT PROCESS IMPROVEMENT)

Decision support systems (DSS) are "computer based information systems (CBIS) that support one or more phases of the decision making process from intelligence to design, choice and implementation" [98].³ Decision support can be conceptualized to include three parts of a knowledge management system: problem finding, problem solving, and knowledge base development. IT can support decision making by collecting, manipulating, and disseminating data and information. Better decisions, defined as being more accurate and timely, may result from the use of decision support technologies to the extent that the information on which they are

³ A broad range of technologies that aid decision makers in organizations has evolved over the past three decades, such as executive information systems, data warehouse systems, online analytical processing systems, artificial intelligence systems, knowledge-based systems, data mining, customer relationship management and group support systems [26].

based is accurate, complete, flexible, relevant, simple, verifiable, accessible, secure, reliable, timely, and economical [102].

The integration of such decision support technologies in the form of a knowledge management system is rare. The need to cross hierarchical and cross-functional boundaries makes it difficult to create appropriate organizational incentive and support mechanisms. It also encourages resistance due to political factors, such as protecting one's turf. While a firm's capability is a necessary condition for implementing DSS, it is far from sufficient for DSS success. DSS implementation depends on the voluntary commitment of personnel [2]. A better understanding of DSS is critical to improving the design, implementation, and operational effectiveness of these systems.

A DSS is useful for problem finding, problem solving, and knowledge development (see Figure 5). Problem finding has been considered by scholars in various disciplines using terms such as executive information systems (digital dashboards for top management), business/competitive intelligence, and environmental scanning, but the timely and accurate identification of management problems is somewhat fuzzy. Meanwhile, knowledge development has only recently emerged as an important and highly promising research area. One of the reasons for this situation is that, typically, IS were traditionally viewed as static systems that help routine decision making, and not as dynamic learning systems that can help in organizational learning.

Research into the design of DSS has focused on problem solving rather than problem finding because it is more tractable and amenable to technology support in a systematic way. Decision support tools are often defined according to an understanding of the underlying demands of the task. In modeling the DSS framework, researchers have commonly examined the relationship between decision support and outcomes. Researchers are beginning to examine the complete set of linkages from decision aid, through decision process, to decision-making effectiveness. For example, Todd and Benbasat [105] present a model in which DSS performance is dependent on DSS strategy, which in turn depends on

the interaction of several factors: DSS capabilities, task, perceived effort, expenditure, and perceived accuracy. Incentives moderate each of the linkages before DSS performance and DSS strategy.

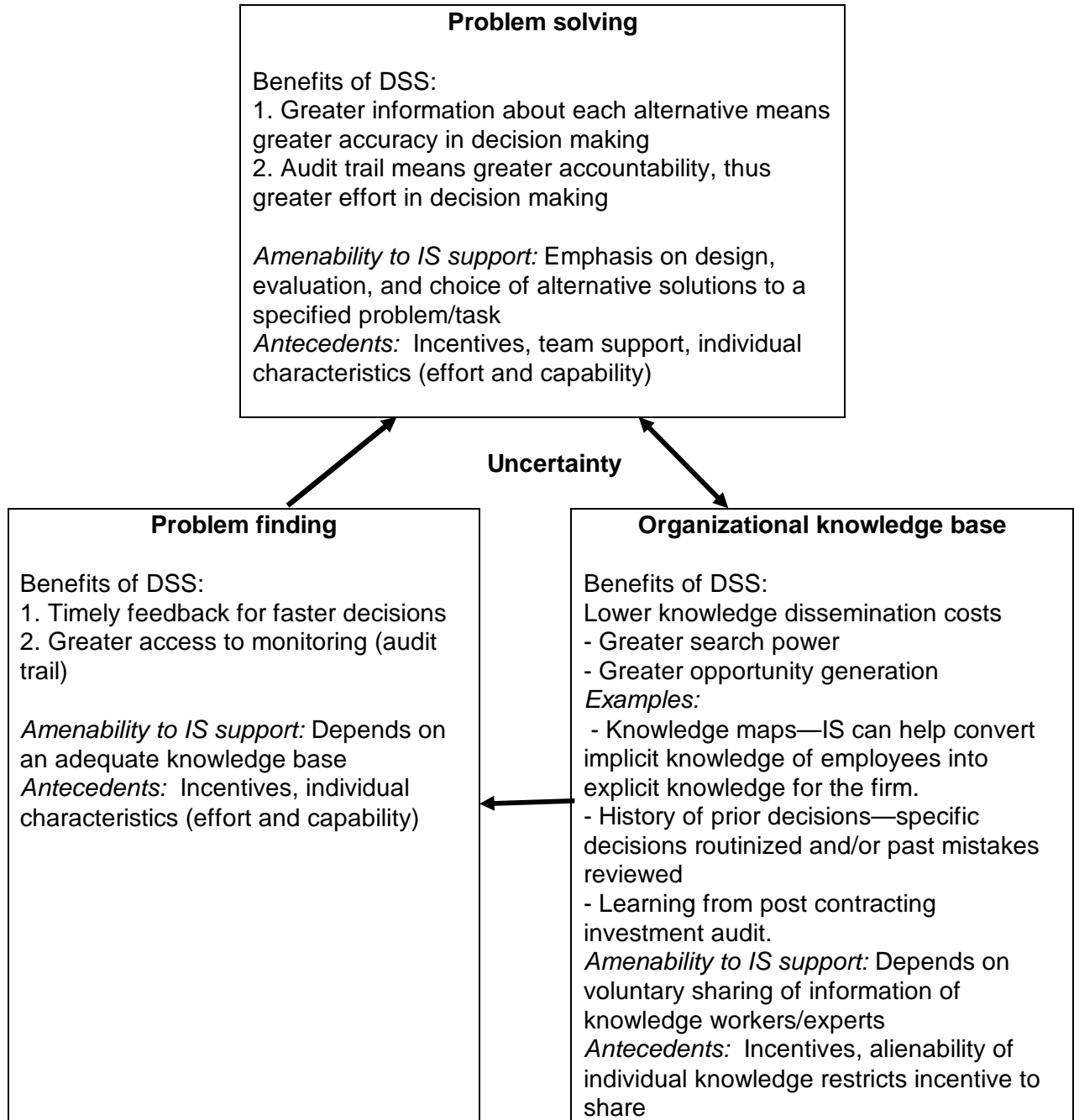


Figure 5. Decision Support System (DSS) Typology

Most studies of DSS implementation have identified key factors that enable or inhibit successful adoption. Kwon and Zmud [53] found that resistance to DSS is related to poor IS interface design, the proposed system’s functionality (being inferior to the current system or less than expected), and user lack of aptitude and motivation to learn new skills and roles. Similarly, Setzekorn et al. [98] reviewed 41 cases of IT implementation and identified six areas of resistance (including, user, task, development process, system and organizational resistance) and propose a conceptual model of the relationship between implementation resistance and success. Compared to other IS, the support of top management (who are the primary beneficiaries of DSS) appears to be a less critical resistance factor, while user involvement and change process competency were more critical to successful DSS implementation.

Accounting perspective

Accounting researchers are interested in quantifying the benefits of the use of a particular technology. They have thoroughly examined the costs and benefits of particular DSS such as activity-based costing and multiple performance measurement systems (e.g. balanced scorecard). Table 1 presents a dichotomy of the direct and indirect benefits of DSS.

Table 1. Benefits of Decision Support Systems (DSS)

	Quantifying the benefits of DSS	Examples of DSS examined in the accounting literature
Direct	1. Decision support system a. Problem finding—timeliness (e.g. ABC, Balanced scorecard). b. Problem solving—accuracy, informed (e.g. greater information processing capability, more accurate knowledge maps (ABC, Balanced scorecard). c. Knowledge management—Reduce knowledge transfer costs (e.g. leveraging span of control through more efficient organizational structure)	1. Strategic cost measurement systems (e.g. activity based costing and total quality management) 2. Strategic performance measurement systems (e.g. balanced scorecard).
Indirect	Learning (competitive advantage) Transparent culture (innovative capability) Morale (decreased turnover)	

Most present value analyses of IT attempt to quantify the indirect benefits of learning, the development of a culture that fits the company's competitive strategy, increasing the quality of products, services, and processes, and high staff morale. These indirect benefits are likely to translate into more tangible returns in the future as they help the firm to develop a competitive advantage and innovative capability (e.g., allow faster responses to changes in the market). The challenge for management is to quantify these future benefits in terms of their links to the present indirect benefits of IT investment.

Accounting research can enrich our understanding of the decision aid/benefits of IS in two specific ways: (i) furthering the work undertaken on accounting-related judgment and decision-making performance, and (ii) providing feedback on the benefits that can be gained from having a particular decision support system in place. First, for a DSS to be effective we need to understand the limitations and biases that are associated with the storage, search for, and retrieval of information in the DSS, and the use of that information in decision making. Accounting researchers have spent considerable time in understanding how the various characteristics of decision makers and the tasks that they perform affect accounting-related judgment performance. Differences in the judgment performance of managers (e.g., accuracy) have been attributed to cognitive mechanisms such as framing [57] and characteristics of the manager such as experience [45] and education [6], and the manager's task, such as the type of feedback [39, 25] incentives [24, 51], time pressure, and the quantity and dimensionality of information available [100].

More recent studies have examined the cognitive biases that are associated with the use of multiple performance measurement information in DSS systems such as the balanced scorecard. This research has found that managers are prone to several biases such as the tendency to put more weight on common than unique measures [9, 58] and outcome effects [28]. Aware of these potential biases, accounting researchers have examined the effectiveness of de-biasing mechanisms such as accountability, experience, and counterexplanation [50]. IS

researchers can expand the focus of this research to include non-accounting information and to develop a clearer picture of the characteristics of an effective DSS. The aim is to improve our understanding of the biases in the information that is provided by a DSS, and to examine the mechanisms that may be effective in reducing such biases, which will ultimately improve to effectiveness of the DSS.

Second, there is limited work on understanding how a firm knows when it gains from the use of a DSS. For example, does the use of a DSS speed up the decision process or produce a superior decision outcome? The large commitment of resources that is typically required for the development of an organizational knowledge base requires measures to help management assess the benefits of an IS. An effective IS is one that grows with increasing volitional use and the sharing of accurate information. Greater sharing of information contributes to a larger knowledge base of experiences that can be used to guide future decision making. Thus, accounting metrics such as the amount of access and the time that users spend accessing and updating various databases can be used to monitor the volitional use of IS and the sharing of information, and whether this use grows with the variety of decisions being made.

The recent focus on the business model in accounting research provides further guidance on how research on DSS may proceed. Recent accounting studies of the lead-lag indicators in an organization's business model [9, 44] have highlighted the importance of the speed and magnitude of the various cause and effect linkages. Luft and Shields [62] point out that researchers should give more attention to the way in which controls are implemented, whether different control system components are implemented at once or in turn, and they also draw attention to understanding the timing of the benefits that can result from the control system in terms of a possible feedback loop for organizational learning.

RE-ENGINEERING (OPERATIONAL PROCESS IMPROVEMENT)

Information technology can be used in various ways to improve the performance of business operations. The traditional approach was to *automate*

the business processes, whereby IT is used to increase the speed or consistency of a firm's operations without changing any of the tasks that make up the different business processes. However, Hammer [35] argues that the benefits of IT application will be limited unless core business processes are *re-engineered*.

Business process reengineering, which is now more generally known as business process change (BPC), represents a type of organizational change that has been both lauded and criticized [37]. BPC creates an organizational culture that supports change through knowledge sharing (often enabled by IT), organizational learning, and external partnering. BPC recognizes the interdependence of organizational structure and IT needs, and acknowledges that without major restructuring, the introduction of IT may not produce savings that are sufficient to justify the investment [12, 103]. BPC focuses on the networks of relationships both within and outside the organization, including "supply-chain integration, e-commerce-based customer service, outsourcing processes, and other buyer-supplier-infomediary relationships" [32].

Even if the need for organizational change is accepted, there is likely to be disagreement about the specific changes that should be made to benefit from IT [7], and what benefits can be expected [111]. At the macro level, the most salient issue is the allocation of the decision-making rights and responsibility centers that shape the hierarchy. This is characterized by the centralization/decentralization paradox, in which IT encourages centralized information management (and decision making) while simultaneously helping to coordinate decentralized routines. To be more specific, IT can facilitate centralization because it increases the information-processing capacity of managers and reduces knowledge transfer costs, by reducing the delays and distortions that are introduced by the movement of information [84]. However, it can also reduce the costs of communication and coordination, and thus allow decisions to be delegated [69].

The micro-level issues concern the scope of the roles and responsibilities and the skills that are required for particular positions (e.g., job definition and content), communication routines, and employee morale. This is characterized by

the specialization/job enrichment paradox, in which IT can enable a firm to subdivide its work into highly specialized and repetitive tasks, and can subject employees to machine control, which can lower morale. At the same time, IT applications can enrich jobs by automating mundane and routine tasks, and replacing low-level clerical jobs with highly skilled professional jobs.

IS Researchers have proposed analytical models to quantify a variety of organizational issues, such as BPC associated with the introduction of IT. However, the models tend to focus on understanding why managers initiate BPC [112] and what types of structural changes occur. For example, Orman [80] proposed a decision-making model that combined the virtues of two theories, complexity and information processing, to suggest that tasks could be decomposed to a level at which the (increasing) marginal level of communication, coordination, and failure costs [65] exceed the (decreasing) marginal gains from repetition (reduction in complexity and savings in human processing and switching costs [92, 110]).

Explanations for the use of different analytic models range from the non-deterministic and complex interactive nature of IT [79, 33] to definitional differences by researchers. For example, IT applications that automate clerical tasks clearly affect different performance indicators than those which provide information to senior management.

Accounting perspective

Achieving good control in a reengineered environment is a challenge for management and is worthy of future research. Effective BPC makes a person perform multiple tasks, but what is its implication for management control systems? As a simple example, in accounting the person who writes the check does not make an entry in the cashbook. However, a combination of such tasks is the objective of BPC. Does this mean that we should discard the old control framework, or do we significantly modify it to address the implications of BPC?

Accounting researchers have used the *theory of complements* to help understand these and other control problems that arise when organizations undertake major changes such as BPC. Researchers have used the three-legged stool as a metaphor to highlight the importance of balancing several control system choices that are made by corporate management: delegation, performance measurement, and incentives (see Figure 6). Balancing these three choices begins with the delegation of decision rights to people who have private information. This helps to boost organizational adaptation and market responsiveness [13]. Knowledge transfer costs within an organization's hierarchy are lower when decision-making rights are moved to individuals who operate at organizational edges [16].⁴

Senior management also needs to choose which performance measures to use. For example, the increased weighting placed on objective measures means that the measurement is increasingly "free from personal bias" [72], which in turn reduces the potential gains from influencing activities [85].⁵ Objective performance measures also provide an important norm of expected performance, as high uncertainty in performance evaluation may otherwise inhibit the development of entrepreneurial attitudes and behavior among managers, thus enlarging agency costs [8]. Finally, a choice of linking rewards to such measures is made because the resultant information asymmetries of delegation make managerial behavior costly or difficult to observe.

⁴ Jensen [46] defines knowledge transfer costs along a specific (general) knowledge continuum that measures high (low) transfer costs. For this paper we refer to knowledge transfer costs in terms of this continuum. See Christie et al. [16] for an extensive review of delegation and knowledge transfer costs.

⁵ The accounting literature identifies several economic attributes of performance measures (informativeness, sensitivity, noise, and objectivity) [74].

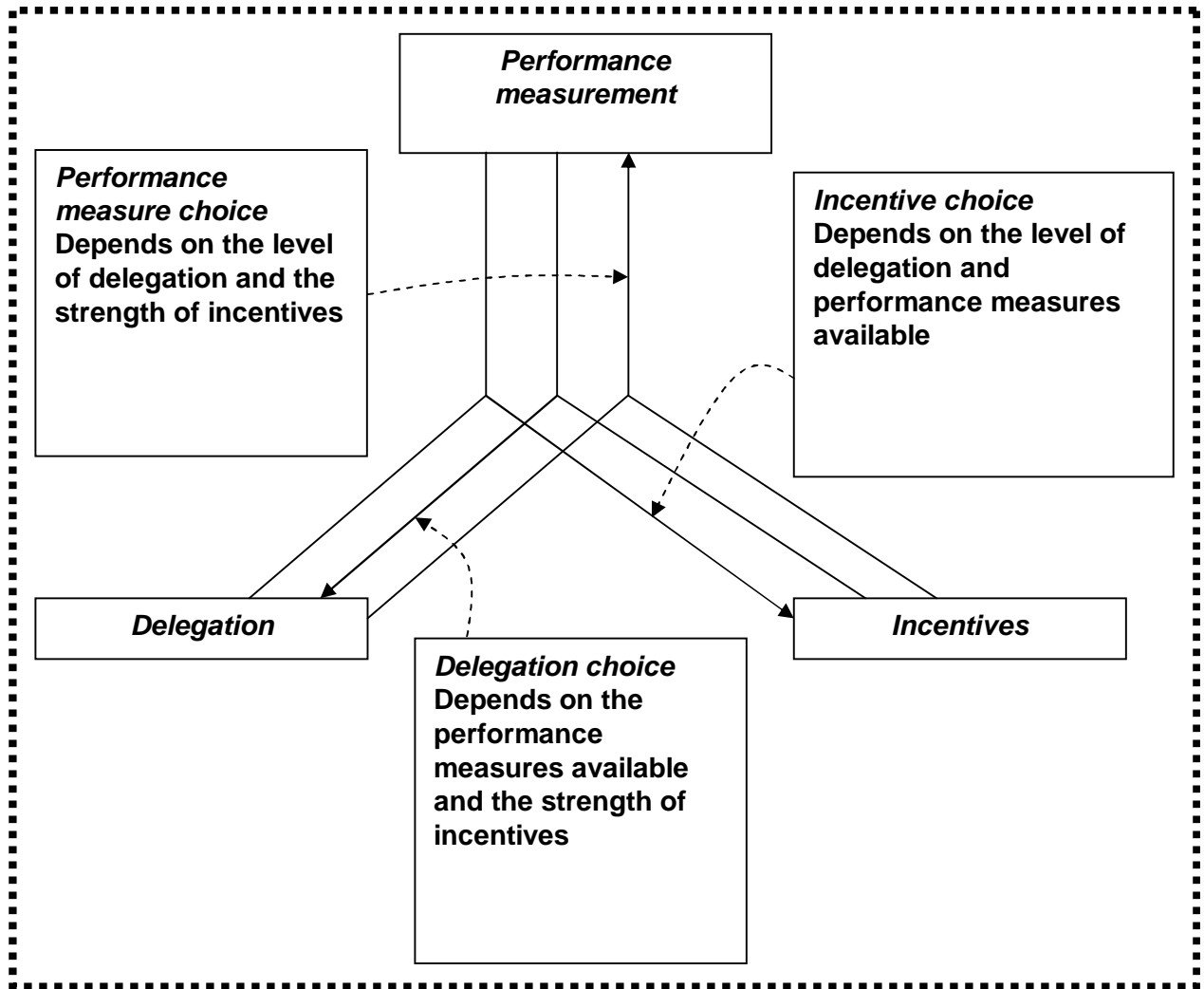


Figure 6. Three-legged Stool—balancing of organizational structure and control components

Accounting researchers have begun to examine the complementary relationships between these choices, such as delegation and incentives [77], delegation and performance measurement [1], and all three components [19]. This research is new and provides scope for further research, particularly in the context of organizations going through discontinuous change.

Recently, accounting researchers have also begun to examine how the effectiveness of separable and inseparable performance measures and type of control system boundary (cooperative or competitive) depends on whether organizations have a strategy of continuous or discontinuous organizational process change [91]. This research ties directly into the BPC literature, yet little is

known about how the controls that are needed to support such discontinuous change are different from those in organizations that are undergoing continuous change. On both of these fronts the opportunities are ripe for further research into the choice of controls in firms that are undergoing BPC.

IV. DISCUSSION

This paper has examined four core IS issues that are associated with the management of IS from an accounting perspective: chargeback, outsourcing, DSS and BPC. Recent developments and insights from the accounting literature have been shown to significantly advance our knowledge in each area. Table 2 summarizes the problems, antecedents, and contributions of the accounting literature to each area, and suggests directions for future research.

We have identified three important themes and several key questions that remain to be answered. The three themes are: (i) the intangible aspect of IT projects, which raises the problems of risk assessment, control, and coordination; (ii) overcoming the judgment and decision-making biases that are associated with using a DSS, and (iii) the authority and incentive structure of the firm, which act as formal boundaries that influence the flow of information and change.

With respect to the first theme, chargeback as it is preached by economists is likely to result in outcomes that force management to consider outsourcing IS services. For chargeback and outsourcing, accounting research has highlighted the tradeoff between user demand and IS support capacity. Chargeback and outsourcing share conditions for IS success. Achieving this balance is important, but it is equally important to know when the scale should be tipped away from efficiency towards flexibility (for strategic value-adding activities in the firm). Tipping the scale in turn requires the use of alternative mechanisms to fill the chargeback void.

Table 2. IS research streams from an accounting perspective

IS area	Problems —Key Question/s	Antecedents —Cost/benefit drivers	Contribution of accounting —Possible directions for future research
Chargeback	How can chargeback be used to balance (i) accountability, (ii) flexibility, and (iii) interdependency between IS service capacity/quality and user demand?	<ul style="list-style-type: none"> - Firm strategy and location of innovation activities - Information quality - Service quality 	<p>What control mechanisms are appropriate to direct and motivate behavior in the innovative functions of the organization?</p> <p>Depends on the location of core competencies and the transparency of the underlying processes. For example, those areas that require greater (less) flexibility may need more informal (formal) controls such as behavioral (action or output) controls.</p>
Post-contractual Outsourcing	<p>How can service quality be maintained?</p> <p>When and how can an outsourcing contract be structured?</p> <p>How can cooperation be facilitated?</p>	<p>Complexity of outsourcing results from (i) intangible nature, (ii) multiple stakeholders, and (iii) delivery of service over time</p> <ul style="list-style-type: none"> - Mobility of time - Mobility of space - Reputation - Core competencies 	<p>What is the extent to which formal measures can be used to strengthen cooperative ties?</p> <p>What are the determinants of controls in facilitating the management of different networks?</p>
Management decision support	<p>How can the judgment and decision making bias in the use of a DSS be overcome?</p> <p>How can the benefits of knowledge management be gained?</p> <p>How does a firm know when it gains from having a new DSS?</p>	<p>The lack of widespread use and integration of various decision support technologies exist due to (i) lack of appropriate incentive and support structure, and (ii) resistance to change.</p>	<p>How can the use of de-biasing mechanisms help to improve the effectiveness of DSS?</p> <p>How can the use of leading performance indicators help to gauge the effectiveness of a DSS?</p> <p>This can help to improve the information provided in the DSS, and help management to understand the benefits (value) of a DSS.</p>
Operational process improvement	<p>How can organizational change be facilitated?</p> <p>How can structure and control in the organizational change process be balanced?</p> <p>There is little agreement about what macro and micro-level changes are needed to take full advantage of BPC.</p>	<ul style="list-style-type: none"> - Macro level support structures - Micro level support structures 	<p>How can the agency costs be balanced with the costs of knowledge transfer (location of authority) in the firm? Theory of complements and the integration of authority, measurement and rewards (i.e. three-legged stool) hold some promise for further research</p> <p>What controls are useful for firms that are undergoing discontinuous change?</p>

Outsourcing has recently attracted much attention from both accounting and IS researchers. The research focus to date has been on initial outsourcing

decision and the terms of outsourcing contracts. More than a decade after IS outsourcing became popular, a better understanding of how to manage its post-contracting stages remains imperative. The relationship networking perspective is useful for considering non-market based relationships between organizations. Accounting measures in the post contracting environment can provide signals that help to maintain the psychological contract and strengthen relational ties between the contracting parties.

We have highlighted the connection between the long-standing chargeback problem and the decision to outsource. With the growth of outsourcing expected to continue, it is important for future researchers to first understand the rationale—chargeback issues being one possibility—behind the decision to outsource before attempting to understand how it is to be managed or how to measure its effectiveness.

Finally, the measurement and control of IS activities, whether in-house or outsourced, will continue to challenge researchers partly due to their intangible nature. Researchers should consider how firms can achieve the right balance of IT investment between tangibles and intangibles. An intangible investment can cause uncertainty [75], and poses difficulties for remaining commercially exploitable [42].

Extending the intangible nature of IT carries into assessing the benefits of IT for decision support and re-engineering. Hence, our review has also highlighted specific issues that are associated with managing DSS and BPC. In reviewing the work of accounting researchers on judgment and decision making, we have suggested that future DSS research can examine the use of de-biasing mechanisms to improve judgment and decision making performance. In response to the question of how we can know when an organization is benefiting from a new DSS, we have noted that future research can continue the recent work into understanding the lead-lag indicators in the organizations business model. Ultimately, when a firm can measure the benefits of its DSS, it is better able to plan for investment that supports its continuing improvement.

In contrast to the DSS, BPC involves a significant change in the organization and structuring of activities. As such there is potential for the firm to reconsider its authority and incentive structure to support the change. Our review proposes that future research should examine *contemporaneously* management's choice of delegation, performance measurement, and incentives in firms that undergo BPC. The three-legged stool framework implies a need to strike a balance between the delegation of authority, performance evaluation, and incentives. The opportunity to learn how the three components interact in supporting the transition process is yet to be fully explored in either accounting or IS research. For example, we perceive a need to restructure incentives and authority regimes to match the new, broader and more efficient channels of communication flows that are provided by IS. The notion of complementarities between these and other factors appears to be relevant to the successful implementation and use of IT. We have also related the recent field-based research into how firms structure their controls when undergoing discontinuous change to future directions for research into BPC.

The four areas that we have reviewed do not represent all of the overlapping interests of accounting and information systems researchers. Indeed, even the accounting IS literature includes other topics, such as behavioral accounting. Despite this limitation of scope, we challenge both accounting and IS researchers to think about old things in new ways. There is much to learn from both the accounting and IS literature on the topic of how to manage IT, and we hope that this paper will encourage accounting and IS researchers to pursue advances in knowledge in a more integrated fashion.

REFERENCES

- [1] M.A. Abernethy, J. Bouwens and L. van Lent (2004). Determinants of Control System Design in Divisionalized Firms, *The Accounting Review*, (79)3, pp. 545-570.
- [2] M Alavi and E Joachimsthaler (1992). Revisiting DSS implementation research: A meta-analysis of the literature and suggestions for researchers. *MIS Quarterly*, (16)1, pp. 95-116.
- [3] M. C. Anderson, R. D. Banker, and S Ravindran (2003). The new productivity paradox. *Communications of the ACM*, (46)3, pp. 91-94
- [4] J.C. Anderson, H. Håkansson, J. and Johanson (1994). Dyadic business relationships within a business network context. *Journal of Marketing*, (58), pp. 1-15.
- [5] L.M.Applegate and R. Montealegre (1991). Eastman Kodak Co.: Managing information systems through strategic alliances. Harvard Business School, Case Number 192-030, Boston, MA.
- [6] R. Ashton (1981). A descriptive study of information evaluation. *Journal of Accounting Research*, 19(1), 42-61.
- [7] M. Attaran (2004). Exploring the relationship between information technology and business process reengineering. *Information & Management*, 41(5), 585-596.
- [8] G. Baker, R. Gibbons, and K.J. Murphy (1994). Subjective performance measures on optimal incentive contracts. *Quarterly Journal of Economics*, (109) Nov, 1125-1156.
- [9] R.D. Banker, G. Potter, and D. Srinivasan (2000). An empirical investigation of an incentive plan that includes non-financial performance measures. *The Accounting Review*, (76)1, pp. 65-92.
- [10] F. Bergeron (1986). Factors influencing the use of DP chargeback information, *MIS Quarterly*, (10)3, pp. 224-233.
- [11] J.G. Birnberg (1998). Control in interfirm co-operation relationships. *Journal of Management Studies*, (35)4, pp. 421-428.
- [12] E. Brynjolfsson (1993). The productivity paradox of information technology. *Communications of the ACM*, (36)12, pp. 67-77.

- [13] R. Bushman, R. Indjejikian, and M. Penno (2000). Private predecision information, performance measure congruity, and the value of delegation. *Contemporary Accounting Research*, (17)4, pp. 561-587.
- [14] P. Chalos and N.G. O'Connor (2004). Determinants of the use of various control mechanisms in U.S.-Chinese Joint Ventures, *Accounting, Organizations and Society*, (29)7, pp. 591-608.
- [15] R.H. Chenhall (2003). Management control systems design within its organizational context: findings from contingency-based research and directions for the future. *Accounting, Organizations and Society*, (28)2-3, pp. 127-168.
- [16] A.A. Christie, M.P. Joye, and R.L. Watts (2003). Decentralization of the firm: theory and evidence, *Journal of Corporate Finance*, (9), 3-26.
- [17] C. Comaford (1994). Does IT really improve your firm's bottom line? *PC Week*, (10) Oct, pp. 28.
- [18] W.H. Delone and E.R. McLean (1992). Information systems success: The quest for the dependent variable, *Information Systems Research*, (3)1, pp. 60-95.
- [19] E.A. Demers, M.B. Shackell and S.K. Widener (2005). Performance Measures Across Multiple Management Perspectives in High-Tech Firms, Working Paper, University of Notre Dame, Notre Dame, IA.
- [20] A.R. Drake, S.F. Haka, and S.P. Ravenscroft (1999). Cost system and incentive structure effects on innovation, efficiency and profitability in teams, *The Accounting Review*, (74)3, pp. 323-246.
- [21] D.H. Drury (1997). Client /server chargeback systems, *Information and Management*, (32)4, pp. 177-186.
- [22] D.H. Drury (1997). The Dialectic of IT Chargeback Systems, *International Journal of Technology Management*, (14)5, pp. 496-512.
- [23] D.H. Drury (2000). Assessment of chargeback systems in IT Management, *INFOR*, (38)3, pp. 293-313.
- [24] C. Eger and J. Dickhaut (1982). An examination of the conservative information processing bias in an accounting framework. *Journal of Accounting Research*, 20(2), 711-723.

- [25] J. Frederickson, S. Pepper, and J. Pratt (1999). Performance evaluation judgments: effects of prior experience under different performance evaluation schemes and feedback frequencies. *Journal of Accounting Research*, 37(1), 151-166.
- [26] G. Forgionne, (2002) Decision-making Support Systems Architecture. In: Forgionne GA, Gupta JND, Mora M (eds.) *Decision-making Systems: Achievements and Challenges for the New Decade*. Idea Group Publishing, Hershey PA.
- [27] J. Gallant (1994). Chargeback's high price. *Network World*, (11) Dec, pp. 50.
- [28] D. Ghosh and R.F. Lusch (2000) Outcome Effect, Controllability and Performance Evaluation of Managers: Some Field Evidence from Multi-Outlet Businesses, *Accounting, Organizations and Society*, (25)4/5, pp. 411-425.
- [29] M.B. Gietzmann (1996). Incomplete contracts and the make or buy decisions: governance design and attainable flexibility. *Accounting, Organization and Society*, (21)6, pp. 611-626.
- [30] M. Greenberger (1966). The priority problem and computer time-sharing, *Management Science*, (12) Jul, pp. 888-906.
- [31] V. Grover, M. Cheon, and J. Teng (1996). The effect of quality and partnership on the outsourcing of information systems functions. *Journal of Management Information Systems*, (12)4, pp. 89-116.
- [32] V. Grover and W.J. Kettinger (1995). *Business process change: A reflective view of theory, practice, and implications*, Chapter 9, pp. 147-172. in V. Grover, W. Kettinger, Harrisburg, PA: IDEA Group Publishing.
- [33] V. Gurbaxani and S. Whang (1991). The Impact of Information Systems on Organizations and Markets, *Communications of the ACM*, (34)1, pp. 59-73.
- [34] H. Håkansson and J. Lind (2004). Accounting and network coordination. *Accounting, Organizations and Society*, (29)1, pp. 51-72.
- [35] M. Hammer (1990). Reengineering work: don't automate, obliterate. *Harvard Business Review*, (68)4, pp. 104-112.
- [36] M. Hancox and R. Hackney (2000). IT outsourcing: frameworks for conceptualizing practice and perception, *Information Systems Journal*, (10), pp. 217-237.

- [37] S. Heusinkveld and J. Benders (2001). Surges and sediments: shaping the reception of reengineering, *Information & Management*, 38(4), 239-251.
- [38] J. Hirschliefer (1956). On the economics of transfer pricing, *Journal of Business*, Jul, pp. 172-184.
- [39] M. Hirst, P.E. Lockett, and K.T. Trotman (1999). Effects of feedback and task predictability on task learning and judgment accuracy. *Abacus*, 35(3), 286-301.
- [40] E. Hufnagel, and J.G. Birnberg (1989). Perceived chargeback systems fairness in decentralized organizations: An examination of the issues, *MIS Quarterly*, (13)4, pp. 415-430.
- [41] J.E. Hunton (2002). Blending information and communication technology with accounting research. *Accounting Horizons*, (16)1, pp. 55-67.
- [42] T. Hussi and G. Ahonen (2002). Managing intangible assets – a question of integration and delicate balance. *Journal of Intellectual Capital*. (3) 3, pp.277-286.
- [43] C.D. Ittner and D.F. Larcker (2001). Assessing Empirical Research in Managerial Accounting: A Value-Based Management Perspective. *Journal of Accounting and Economics*. (32) Dec, pp. 349-410.
- [44] C.D. Ittner, D.F. Larcker and M.W. Meyer (2003). Subjectivity and the weighting of performance measure: Evidence from a balanced scorecard. *The Accounting Review* (78)3, 725-758.
- [45] E. Iselin (1988). The effects of information load and information diversity on decision quality in a structured decision task. *Accounting, Organizations and Society*, 13(2), 147-164.
- [46] M.C. Jensen,(1998). *Foundations of organizational strategy*. Cambridge, Massachusetts: Harvard University Press.
- [47] C.S. Jones (1998). Hierarchies, networks and management accounting in NHS hospitals. *Accounting, Auditing and Accountability Journal*, (12), pp. 164-187.
- [48] C. Kanodia, R. Bushman and J Dickhaut (1989). Escalation errors and the sunk cost effect: an explanation based on reputation and information asymmetries. *Journal of Accounting Research*, (27), pp. 59-77.

- [49] T. Keller and L. Allen (1993). Tipping toward chargeback. *Software Magazine*, (13), pp. 121-122.
- [50] J. Kennedy (1995). Debiasing the curse of knowledge in audit judgment, *The Accounting Review*, (70)2, pp. 249-273.
- [51] J. Kirby (2002). HBR Case Study: The cost center that paid its way. *Harvard Business Review* 80(4): 31-34.
- [52] R. Klepper (1995). The management of partnering development in IS outsourcing, *Journal of Information Technology*, (10)4. pp. 249-258.
- [53] T. Kwon and R.W. Zmud (1987). *Unifying the fragmented models of information systems implementation in critical issues in information systems research*, R.J. Boland and R.A. Hirshcheim (eds.), New York: John Wiley and Sons, Ltd.
- [54] M.C. Lacity and L.P. Willcocks (2000). Relationships in IT Outsourcing: A Stakeholder Perspective in *Framing the Domains of IT Management Research: Glimpsing the Future through the Past*, R. Zmud (ed.), Pinnaflex: Cincinnati, OH, 2000.
- [55] M.C. Lander, R.L Purvis, C.E. McCray and W. Leigh (2004). Trust-building mechanisms in outsourced IS development projects: A case study, *Information & Management*, (41)4, pp. 509-523.
- [56] J.N. Lee (2001). The impact of knowledge sharing, organizational capacity and partnership quality in IS outsourcing success, *Information & Management*, (38)5, pp. 323-335.
- [57] M.G. Lipe (1993). Analyzing the variance investigation decision: The effects of outcomes, mental accounting, and framing . *The Accounting Review*, 68(4), 748-764.
- [58] M.G. Lipe and S. Salterio 2000. The balanced scorecard: Judgmental effects of common and unique performance measures. *The Accounting Review* 75 (3): 283–98.
- [59] L. Loh and N. Venkatraman (1991). Joint venture formations and stock market reactions: An assessment in the information technology sector. *Academy of Management Journal*, (34)3. pp. 869-892.
- [60] L. Loh and N. Venkatraman (1992). Diffusion of information technology outsourcing: Influence sources and the Kodak effect. *Information System Research*, (3) Dec, pp. 334-358.

- [61] L. Loh and N. Venkatraman (1992). Stock market reaction to information technology outsourcing: An event study. Working Paper 3499-92BPS, Alfred P. Sloan School of Management, MIT.
- [62] J. Luft and M.D. Shields (2003). Mapping management accounting: graphics and Guidelines for theory-consistent empirical research. *Accounting, Organizations and Society*, (28)2-3, pp.169-249.
- [63] R. Magee and J. Dickhaut (1978). Effects of compensation plans on heuristics in cost variance investigations. *Journal of Accounting Research* 16(1), 294-314.
- [64] T.W. Malone (1987). Modeling coordination in organizations and markets. *Management Science*, (33)10. pp. 1317-1332.
- [65] T.W. Malone and S.A. Smith (1988). Modeling the performance of organizational structures. *Operations Research*, (36)3. pp. 421-436.
- [66] L. Markus, C. Tanis and P. Van Fenema (2000). Multisite ERP implementations, *Communications of the ACM*. (43) Apr, pp. 42-46.
- [67] M. Martinsons, R. Davison, D. and Tse (1999). The balanced scorecard: A foundation for the strategic management of information systems, *Decision Support Systems*, (25)1, pp. 71-88
- [68] M.G. Martinsons (1993). Outsourcing information systems: A strategic partnership with risks, *Long Range Planning*, (26)3, pp. 18-25.
- [69] M.G. Martinsons (1995). Radical process innovation using information technology, *International Journal of Information Management*, (15)4, pp. 253-269.
- [70] M.G. Martinsons and A. Leung (2002). Strategic information systems: A critical success factors model, *International Journal of Services Technology Management*, (3)4, pp. 398-415.
- [71] W.P. McKinnon and E.P. Kallman (1987). Mapping chargeback systems to organizational environments, *MIS Quarterly*, (11)1, pp. 5-20.
- [72] K.A. Merchant (1989). *Rewarding results: motivating profit center managers*. Boston: Harvard Business School Press.
- [73] S.M. Miranda and C.B. Kavan (2002). Moments of Governance in IS Outsourcing: A Theoretical Model, Working Paper, Florida Atlantic University.

- [74] F. Moers (in press). Discretion and bias in performance evaluation: the impact of diversity and subjectivity. *Accounting, Organizations and Society*, 2005.
- [75] J. Mouritsen, A. Hansen and C.O. Hansen (2001). Inter-organizational controls and organizational competencies: episodes around target cost management/functional analysis and open book accounting. *Management Accounting Research* (12), pp. 221–224.
- [76] J. Mouritsen, H.T. Larsen and P.N. Bukh (2001) Intellectual Capital and the 'Capable Firm': Narrating, Visualising and Numbering for Managing Knowledge, *Accounting, Organizations and Society* Vol., 26, No7, pp. 735-762.
- [77] V. Nagar (2002). Delegation and incentive compensation. *Accounting Review*, (77)2, pp. 379-395.
- [78] D. Nicolini, C. Tomkins, R. Holti, A. Oldman, and M. Smalley (2000). Can target costing and whole life costing be applied in the construction industry? Evidence from two case studies. *British Journal of Management* (11), pp. 303–324.
- [79] W.J. Orlikowski (1992). The duality of technology: rethinking the concept of technology in organization Science. *Organization Science*, (3)3, pp. 398-427.
- [80] L.V. Orman (1998). A model management approach to business process reengineering. *Journal of Management Information Systems*, (15)1, pp. 187-212.
- [81] W.G. Ouchi (1980). Markets, bureaucracies, and clans. *Administrative Science Quarterly* (25)1. pp. 129–141.
- [82] L.G. Paul (1994). The meter is running: network chargeback is becoming essential to divvying up the expenses for your IT services. *PC Week*, Oct, p. 25.
- [83] D. Paulson and Y. Wand (1992). An automated approach to information system decomposition. *IEEE Transactions on Software Engineering*, (18)3, pp. 174-189.
- [84] J. Pfeffer and H. Leblebici (1977). Information technology and organization structure. *Pacific Sociological Review*, (20), pp. 241-261.

- [85] C. Prendergast (1999). The provision of incentives in firms. *Journal of Economic Literature*, (37) Mar, 7-63.
- [86] C. Prendergast (2002). Consumers and Agency Problems. *Economic Journal*. (112) Mar, pp. C34-C51.
- [87] J.F. Rockart, M.J. Earl and J. W. Ross (1996). Eight Imperatives for the New IT Organization, *Sloan Management Review*, (37)1, pp. 43-55.
- [88] H.O. Rockness and M.D. Shields (1984). Organizational Control Systems in Research and Development, *Accounting, Organization and Society*, (9)2, pp. 165-177.
- [89] F. Roodhooft and L. Warlop (1999). On the role of sunk costs and asset specificity in outsourcing decisions: a research note. *Accounting, Organizations and Society*, (24)4, pp. 363-369.
- [90] J.W. Ross, M.R. Vitale, and C.M. Beath (1999). The untapped potential of IT chargeback, *MIS Quarterly*, (23)2, pp. 215-237.
- [91] C. Rowe, J.G. Birnberg, and M.D. Shields, (2006). Effects of Organizational Process Change on Management Control Systems and Revelations of Managers' Private Knowledge. Working paper, Arizona State University, Phoenix, AZ.
- [92] J.A. Samuels, and J.P. Steinbart (2002). The Journal of Information Systems: A Review of the First 15 Years. *Journal of Information Systems*, Fall 2002, (16)2, pp. 97-117.
- [93] L. Sayeed and H.J. Brightman (1994). Can information technology improve managerial problem finding. *Information & Management*, 27(6), 377-390.
- [94] D. Schaller (1974). Survey of computer cost allocation techniques, *Journal of Accountancy*, (137) Jun, pp. 41-49.
- [95] W. Seal, J. Cullen, A. Dunlop, T. Berry, and M. Ahmed (1999). Enacting a European supply chain: a case study on the role of management accounting. *Management Accounting Research* (10), pp. 303–322.
- [96] W. Seal and P. Vincent-Jones (1997). Accounting and trust in the enabling of long-term relations. *Accounting, Auditing and Accountability Journal*, (10), pp. 406-431.

- [97] P.B. Seddon (1997). A respecification and extension of the DeLone and McLean model of IS success, *Information Systems Research*, (8)3, pp. 240-253.
- [98] K. Setzekorn, V. Sugumaran and N. Patnayakuni (2002). A Comparison of Implementation Resistance Factors for DMSS Versus Other Information Systems, *Information Resources Management Journal*, (15)4, pp. 48-63.
- [99] J. Shank and V. Govindajaran (1992). Strategic cost management: the value chain perspective. *Journal of Management Accounting Research*, (4), pp. 179-197.
- [100] M. Shields (1983). Effects of information supply and demand on judgment accuracy: Evidence from corporate managers. *The Accounting Review* 58(2), 284-303.
- [101] J.J. Sobczak (1974). Pricing Computer Usage, *Datamation*, (20) Feb, pp. 61-64.
- [102] R.M. Stair and G.W. Reynolds (2001), *Fundamentals of Information Systems*, Cambridge, MA: Thompson Learning.
- [103] T. Stratopoulos and B. Dehning (2000). Does successful investment in information technology solve the productivity paradox? *Information and Management* (38)2, pp. 103-117.
- [104] J. Teng, M. Cheon and V. Grover (1995). Decisions to outsource information system functions: Testing a strategy-theoretic discrepancy model, *Decision Sciences*, (26)1, pp. 75-103.
- [105] P. Todd and I. Benbasat (1999). Evaluating the Impact of DSS. Cognitive Effort, and Incentives on Strategy Selection. *Information Systems Research*, (10)4, pp. 356-374.
- [106] C. Tomkins (2001). Interdependencies, trust and information in relationships, alliances and networks. *Accounting, Organization and Society* (26)2, pp. 161-191.
- [107] J Van der Meer-Kooistra and E.G.J. Vosselman (2000). Management control of interfirm transactional relationships: the case of industrial renovation and maintenance. *Accounting, Organization and Society* (25)1, pp. 51-77.
- [108] C.A. Van Lengen and J.N. Morgan (1993). Chargeback and the maturity of MIS use, *Information & Management*, (25)3, pp. 155-163.

- [109] J.M. Verner, K. Toraskar, and R. Brown (1996). Information systems chargeout: A review of current approaches and future challenges. *Journal of Information Technology*, (11), pp. 101-117.
- [110] Y. Wand and R. Weber (1990). On ontological models of an information system. *IEEE Transactions on Software Engineering*, (16)11, pp. 1282-1292.
- [111] M.E. Whitman (1996). IT divergence in reengineering support: Performance expectations vs. perceptions. *Information & Management*, 30(5), 239-250.
- [112] L.L. Wu (2002). A model for implementing BPR based on strategic perspectives: an empirical study. *Information & Management*, 39(4), 313-324.
- [113] J.L. Zimmerman (1997). *Accounting for decision making and control*, New York: Irwin, Chapter 7.