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Business Value of IS Investments

71.1 Introduction

The concept and constructs surrounding the business value of information systems (IS) have matured through the 1990s and into the twenty-first century. As data processing grew to information services and the data processing manager evolved to the chief information officer, evaluating the cost of technology has culminated in the valuation of the enterprise IS contributions, architecture, and innovations. The resultant question that the topic addresses is How do we measure the ultimate impact that our expenditures on IS have on the strategic outcomes of the organization?

This chapter provides an overview of the underlying principles, research findings, practical applications, and future trends in the efficacy and measurement of the business value of IS investments. Early efforts sought to determine tangible returns as evidenced in the financial statements. Current thinking posits that the investments yield strategic returns when skillfully applied by the chief information officer (CIO) with integrative and innovative vision within an organization that has the knowledge and abilities to use the investments. The understanding of the practice of measuring the business value of IS has moved systematically from the narrow focus of viewing IS as a collection of hardware and software that creates a technology capital investment to a collection of hardware and software that enables organizational processes that may be departmental or global to drive strategy. The former can be calculated succinctly to evaluate efficiency (doing things right); the latter is calculated at the organizational level to measure effectiveness (doing the right things).
71.2 Underlying Principles: What Do We Mean by “Business Value of IS Investments”?

Organizations measure their functional performance using metrics on the financial statements. Marketing is evaluated through revenues and market share. Improvements in operations are demonstrated through decreasing costs, return on assets (Kobelsky et al. 2008), and inventory turns (Dehning et al. 2007). Investments yield returns; profits increase dividends, retained earnings, and owners’ equity. When thinking about the business value of IS investments, executives seek comparable metrics to evaluate whether or not the resources put into their information architecture have provided and/or are anticipated to provide tangible value. Additionally, traditional metrics of return on investment (ROI) are often conceptualized as tangible value realized from the actual technology purchase with less consideration of the differential returns resulting from employee development and process improvements (Im and Rai 2008). Generally, executives look at competing investments, the duration of potential payoffs, and the overall economic situation of the organization to justify expenditures in information technology (IT) (Weill 1992; Barua et al. 1995; Brynjolfsson and Hitt 2000; Devaraj and Kohli 2002). Increasingly, the focus of IS investments is on outcomes such as agility (Tanriverdi et al. 2010), flexibility (Saraf et al. 2007), risk management (Dewan and Ren 2011), and interfirm collaboration (Richey and Autry 2009).

Principle 1—The business value of IS investments is best viewed from both a variance and a process approach. The variance approach to measuring the value of IS investment seeks tangible improvements in organizational metrics such as increased revenues or decreased costs (Weill 1992; Brynjolfsson and Hitt 2000). The process approach recognizes that even when the value of IS investment might be realized in traditional organizational metrics, firms may choose to pass the value on to their consumers as lower prices in order to sustain customer loyalty (Barua et al. 1995). The value of IS may not be identifiable with traditional financial statement metrics. The process approach seeks improvements in the processes affected by the IS investment and views internal process metrics as leading indicators of organizational value. Kohli and Hoadley (2006) present a theoretical framework (see Figure 71.1) that combines the two approaches. The framework recognizes the importance of overall organizational performance as a primary indicator of the value of IS investment while also providing a way to evaluate such an investment in an industry where competitive factors may mask that value or where the value realization may lag the investment by multiple time periods. Whether the business value of an IS investment is passed on to consumers, is mitigated by overall economic conditions, or is lagging the periodic reporting of organizational performance, the measurement of that value is still important to the strategic planning and decision making of the enterprise.

Principle 2—The business value of IS investments is best measured using balanced multiple metrics. Metrics quantify the value of IS in ways that can be evaluated, compared, and improved. However, there should not be a single set of metrics. Instead, organizations can best measure the value of their IS investments by using and evaluating financial and operational metrics, tangible and intangible metrics, immediate and lagged metrics, and productivity, profitability, and customer value metrics. This may appear to be an overdose of measurement. However, when viewed as a balanced scorecard of metrics, the overall measurement provides the best opportunity to identify the interdependencies of the IS investments and organizational performance (Devaraj and Kohli 2002). Such a balanced scorecard approach would measure the value of the IS investment from the perspective of the customer, the efficiency of the operations, the external positioning of the firm, the innovative capabilities of the employees, and the financial return of the investments. Planning the best metrics to use to view IS investments from multiple perspectives supports the holistic evaluation and improvement of the organization’s IS implementation.
Principle 3—The potential for realized business value of IS investments depends on the position of the asset on the technology maturation curve.

Organizations must pay attention to the maturation curves of new technologies as well as assess their own comfort level with new “bleeding edge” technologies and with old tried-and-true technologies. The former technologies offer higher potential for process improvement and return value; the latter technologies offer lower risk of failure. Both may work in the organizational portfolio of interdependent systems, but all will be retired eventually. Organizations must align their technology adoption processes to the risk tolerance of the firm. Successful alignments have been made in organizations that are able to recognize and retire technologies that risk obsolescence, recognize competitors in related fields that may threaten the competitive landscape, and identify usability factors in a new technology that eases acceptance.

Strategic IS implementations may employ disruptive technologies, characterized as emerging technologies that are rapidly developing in ways that are attractive to a small segment of consumers (Bower and Christensen 1995) and are yet invisible to those enterprises that strive to stay close to their current customers. Disruptive technologies exploit novel attributes that are not desirable to current customers but that are quickly adopted by a new customer segment and that lure away a significant portion of the current customer base. Just as Blockbuster was challenged by Netflix and Research in Motion had to deal with Apple’s iPhone, so will all organizations be required to be continually vigilant in their evaluation of emerging technologies. According to Gartner, within the next 5–10 years, augmented reality, crowdsourcing, and 3D scanners will be the norm (LeHong and Feng 2012). The values of these technologies are difficult to evaluate within an existing firm and often are viewed as having little or no value to a current customer base. To minimize the risk of disruptive technologies, the enterprise must be vigilant in understanding the strategic significance of its own existing technology portfolio as well as emergent technologies that present creative opportunities for competition.
Principle 4—The business value of IS investments is justifiable using multidimensional approaches.

Principles 1 through 4 lay the foundation for justifying an IS investment. This justification is essentially using the business value of an IS project to lay out the business case to promote investing in that particular project over alternative opportunities for investing the same funds. This is done by converting the value of an IS investment and its project payoff into a logical or mathematical form and comparing the factors of the project against similar factors in the alternative opportunities. Organizations employ differing approaches to justifying resources investment such as intuition-based models, cost-benefit analysis, break-even analysis, net present value, economic value added, and regression-based statistical analysis. For future opportunities, firms use real options–based methodologies to justify IS investment for which NPV or ROI cannot be calculated (Fichman 2004). Each of these approaches quantifies organizational factors of performance and uses these quantifications to compare potential investments. Another approach (Flatto 1996) enhances a net present value approach by incorporating risk management and investment changes into the model. Though each justification approach quantifies like factors of competing projects, the assessment of future value is likely to best predict achieve positive outcomes when approaches are combined to calculate a holistic evaluation with multiple dimensions rather than evaluating each project dimension separately.

Principle 5—Sustained measurement of IS value is accomplished through a comprehensive organizational process.

Measurement of the business value of IS investment is most meaningful when incorporating all factors of the project as implemented. This means that the project must be initially developed with measurement of business value incorporated into the work. One cannot wait until after user acceptance of an IS project before building the measurement structures and gathering evidence of the payoff. Further, when the value of IS investment emerges in other parts of the organization, demonstrating business value is not only the responsibility of the IS managers; rather, it is an organization-wide process (Kohli and Johnson 2011). Therefore, a comprehensive process of value measurement should span the phases from pre-investment to post-investment review.

An exploration phase develops an understanding of what is to be measured, how it will be quantified, and which data techniques are most appropriate for analysis. A discovery phase addresses organizational issues in order to maximize the managerial and political factors of IS business value. The analysis phase collects, analyzes, and reports the data that demonstrates the quantifiable portion of IS business value. The communication phase is the feedback loop that provides the information back to the organization as to the outcome of the analysis and the language that will be used to institutionalize a preference, culture, and bias of measurement of value. Using a comprehensive evaluation process makes the measurement of IS business value a quarter involved with data and three quarters involved with organizational planning, involvement, and communication. Many projects fail, even though they may employ analysis, because they fail in the organizational quadrants. Incorporation of all phases improves the probabilities of implementing demonstrable and sustainable value in one IS investment and supports a culture of linking together like investments over time.

Principle 6—Strategic integration of IS value measurement informs planning and decision making.

Following a process of measuring the business value of an IS investment does not guarantee strategic benefits. It is not until the value measurement is used for planning future strategic initiatives and making decisions for operational improvements that the business value is realized. Organizations must communicate the measurements across multiple levels and through multiple channels. Executive leadership uses measurement to identify immediate and lagging payoffs, to locate impacts that may occur outside the locus of the investment, and to communicate to stakeholders that the vision for the future is achievable through concrete actions that permeate the organization. The integration of business value with senior management motivation, planning, and decision making is an emerging area of research (Salge et al. 2011).
71.3 Trends in the Field

As the measurement of the business value of IS has evolved, different trends have emerged that have generated interest because of their practical application and importance to a fuller understanding. The first trend is a shift from measuring efficiency as a saving of time and materials to measuring effectiveness of the outcomes of systems. Though efficiency remains as an important base for improvement, organizations seek value in systems that achieve the desired goals for themselves, their suppliers, and their consumers. A second trend is the consideration of the sustainability of the business value of IS. It is important to realize first-time, one-time, and current value of the IS investment. It is also becoming more important to sustain that value as long as possible and to recognize the appropriate time to retire or transition an organizational system. A third trend incorporates the global effects of IS and views the business value of IS as the linking mechanism among strategic partners. The goal is to enable synergies that expand the capacities of organizations beyond those that are possible for each one alone. Finally, an emerging trend is to view the business value of IS investments in how they expand the total collection of resources of an enterprise. This view includes the possibility that IS investments enable creative and innovative opportunities above and beyond the streamlined processes of the organization. These opportunities are realized in combinations of organizational assets, strategic vision, and human creativity all synthesized using the firms IS. These trends represent an expansion of the base research presented in the underlying principles of the business value of IS and indicate areas of future investigation that are of interest to practitioners and researchers.

71.3.1 Shift from Efficiency Measures to Effectiveness Measures

The ideas surrounding the importance of the business value of IS have endured since the 1990s. In the 1980s, the Society for Information Management began annually to survey executives in IS to determine the key issues facing them. In 1996, in the midst of the ramp up to Y2K, 70% of the topics reported were issues of IS hardware and software (Brancheau et al. 1996). The issue that eventually was incorporated in the business value of IS—aligning the IS organization within the enterprise—was ranked #9. Since then, the topic label has become “information technology (IT) and business alignment” (Table 71.1). From 2005 to 2010, the topic has remained at or near the top of the list, currently sharing the spot with organizational issues such as “business productivity and cost reduction” and “business agility and speed to market” (see Table 71.1). Additionally, this topic has remained an important focus of study for IS academics as seen in conference proceedings and special issues of journals.

The practitioner press also has evolved in its view of the importance of IS value (Chillingworth 2010). For example, CIO magazine (Overby 2011) stated that those CIOs who want to remain part of a strategic company must shift from using IT simply as a tool to support the strategy of the firm. Likewise, the CIO must become a business leader who can understand business value and communicate the ways that IS can and does create, enhance, and enable that business value (Mitra et al. 2011). Businesses must develop strategy that deploys IT to connect the information assets to their decision makers and customers and then lead the communication of how those assets create value.

The shift from efficiency to effectiveness was presented early on (Soh and Markus 1995), bringing together the constructs of process measurement and IT metrics. The process of the realization of value from investments in IT was articulated as follows: IT expenditures lead to IT assets that have IT impacts that are subsequently realized as organizational performance. The IT expenditures and organizational performance had normally been measured as part of the financial statement. Understanding the intermediate measures provided a way to understand the time delay and mitigating factors between the cause and effect of the variables.

To link efficiency to organizational performance, three categories of metrics were articulated: productivity, business profitability, and consumer surplus (Hitt and Brynjolfsson 1996). The fact of measuring
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at the organization level moved the metrics into the realm of the c-level executives and beyond the limited scope of the CIO. Adding consumer surplus brought the measurement focus on effectiveness. If the IS investments were effective, the organization’s customers could realize improvements from those investments. Understanding these organizational performance metrics provided a way to incorporate a broader concept of value to include effectiveness. Additionally, consumer surplus could explain why an organization could realize a large value of effectiveness from IS investments but not see it in profitability because it had passed the value on to its customers.

The interaction between IT implementation, business process reengineering (BPR), and organizational performance was examined across over 300 firms between 1996 and 1999 (Ramirez et al. 2010). The results indicate that synergies between IT and BPR implementations result in improved productivity, efficiency, and improved market value. These findings support the importance of both efficiency and effectiveness at the organizational level when measuring the business value of IS.

One component of measuring effectiveness is evaluating increases in intangible assets (Tambe et al. 2011). These intangible IT assets include a firm’s work practices, information structures, and employee-skill mix that are ancillary to the tangible IT investments. Research in a longitudinal study found that the quantity of intangible IT assets increased from 1987 through 2005 making those assets available for future productivity gains for the organizations. The accompanying low levels of depreciation of the assets indicate a stockpiling. It was concluded that investment in these intangible assets is linked to the growth of significant productivity and should lead to growth. Yet, the importance of these findings is the articulation of specific metrics of intangible IT assets that lend themselves to quantitative analysis similar to tangible assets.

### TABLE 71.1 MISQ Executive Key Issues

<table>
<thead>
<tr>
<th>MISQ Executive Key Issues for IS Executives (2005–2010)</th>
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<tbody>
<tr>
<td><strong>2010</strong> • Business productivity and cost reduction</td>
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<td>• Business agility and speed to market</td>
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<td>• IT and business alignment</td>
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<td>• IT reliability and efficiency</td>
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<td>• Business process reengineering</td>
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<td><strong>2009</strong> • Business productivity and cost reduction</td>
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<td>• IT and business alignment</td>
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<td>• Business agility and speed to market</td>
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<td>• Business process reengineering</td>
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<tr>
<td>• IT cost reduction</td>
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<tr>
<td><strong>2008</strong> • IT and business alignment</td>
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<tr>
<td>• Build business skills in IT</td>
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<td>• IT strategic planning</td>
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<tr>
<td>• Attracting IT professionals</td>
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<tr>
<td>• Making better use of information</td>
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<tr>
<td><strong>2007</strong> • Attracting, developing, retaining IT professionals</td>
</tr>
<tr>
<td>• IT and business alignment</td>
</tr>
<tr>
<td>• Build business skills in IT</td>
</tr>
<tr>
<td>• Reduce the cost of doing business</td>
</tr>
<tr>
<td>• Improve IT quality</td>
</tr>
<tr>
<td><strong>2005</strong> • IT and business alignment</td>
</tr>
<tr>
<td>• Attracting, developing, and retaining IT professionals</td>
</tr>
<tr>
<td>• Security and privacy (tied with above)</td>
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<tr>
<td>• IT strategic planning</td>
</tr>
<tr>
<td>• Business process reengineering</td>
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In spite of the years of research into the business value of IS, the concepts, terminologies, and findings remain fuzzy. Some small portion of the perception of long-term vagueness is the reality that “years of research” in the field of IS is not actually as long as “years of research” say, in medieval Scottish poetry. However, it is problematic that theory remains underdeveloped and loosely applied (Schryen 2010). To fully comprehend the phenomenon of the business value of IS for efficiency and effectiveness, programs of research must link studies together and should strive to progressively expand the body of knowledge. Literature reviews must use the theoretical base as a skeletal framework to tie the literature together in a meaningful way that creates knowledge with predictive and explanatory power.

71.3.2 Sustaining the Business Value of IS over Time

An additional focus of research in the area of the business value of IS is that of value sustainability. Organizations may or may not realize immediate or even lagged value from their investments in IS. However, a greater challenge may be to sustain those improvements in effectiveness as seen in profitability, productivity, and consumer value. An examination of firms across multiple industries receiving awards for their realization of value from their IS investments (Masli et al. 2011) looked for improvement of organizational performance over time as well as the duration of improvements. Structural shifts such as Y2K and the dot.com era slowdown caused many of these firms to lose momentum at the turn of the century. However, the study shows that since that time, many of the firms have struggled to sustain the realized value of their IS investments.

Of particular interest are those firms striving to employ sustained IS investment to achieve a low-cost position in a competitive environment (Tallon 2007). The challenge comes from the commoditization of the IT infrastructure that is more easily replicated by others. Those firms that have achieved a level of business value sustainability are those firms with multiple successful IS implementations. This confirms the principle that measuring business value of IS is best accomplished using multiple metrics at the organizational and process levels (see Figure 71.1), and that a culture of using IS to achieve organizational goals contributes to sustaining the business value.

71.3.3 Business Value of Inter-Organizational IS

As businesses seek new ways to achieve their missions and goals, they find that viewing themselves as singular entities competing among others limits their opportunities for success. Firms that seek strategic partners to achieve shared aims realize increasing returns through implementations of interoperable systems. An emerging research question (Grover and Kohli 2012) is asking how separate organizations can exploit their inter-organizational IS to realize values to each that neither could realize on its own.

The relational view proposed in the strategy literature (Dyer and Singh 1998; Dyer 2000) presents a model of four factors that relate to value co-creation within multiple organizations:

- **Relationship-specific assets** are those shared assets that enable value co-creation to those firms in the partnership and are protected to ensure their use being limited solely to those organizations.
- **Complementary resources and capabilities** are those within one or more of the organizations in the partnership that enable value co-creation within the partnership but which could not enable value co-creation solely within one of the organizations.
- **Knowledge-sharing routines** enable shared information and expertise to inform value co-creation.
- **Governance** includes contracts and financial protections that streamline costs and boost the incentives for value co-creation.

While numerous examples of these factors and concepts exist, research into value co-creation has a broad horizon of opportunity to add to current theory for expanded understanding and application.
71.3.4 Capabilities of the Firm vs. a Systems Theory View

An alternative framework for understanding and examining the business value of IS is based on the creation of capabilities within a firm (Nevo and Wade 2010). In this framework, existing research takes a resource-based view of the firm explaining that such a view assumes that firms compete based on their own organizational resources. Those organizational resources that have the potential for strategic improvement of the firm must have value, rarity, inimitability, and nonsustainability (Barney 1991). Since IT assets are available and replicable, the strategic potential is minimal. Instead, it is the IS resources that have those factors for creating and sustaining competitive advantage. Therefore, much of the literature that has focused on the business value of IT instead should look at the synergies created between organizational characteristics and IT assets for examining the organizational impact.

IT-enabled resources [and IS assets] are developed when IT assets and organizational resources join to achieve effective mission performance (Nevo and Wade 2010). The emergent capabilities may be predicted or not and may have a positive, negative, or neutral impact on the firm. Those positive emergent capabilities are labeled as synergy and are sought to achieve organizational goals. The research in the business value of IS should determine the factors in why some potential emergent capabilities are synergistic and others fail to achieve positive outcomes.

Currently, firms face hypercompetition where the industry is marked with products and services that evolve dynamically and stretch the competitive environment of the business. In these organizations, the business value of IS is realized when it supports the ability of the firm to adapt its processes and information flows along with these dynamically evolving products and services (Tallon et al. 2002; Tanriverdi et al. 2010). The adaption includes seeking new areas of competitive advantage while sustaining old products and services only so long as they sustain their business value. The adaptation is mirrored by evolving IS that sustain a series of competitive advantages over time. There is additional evidence that a flexible IT infrastructure that is aligned with the organization’s strategic goals yields organizational agility critical to the achievement of those strategic goals (Tallon and Pinsonneault 2011). The overall IS support of business competition plays out like a concerto with slower and faster movements, yet with a sustaining theme of business value.

71.4 Evolving Role of CIO

In addition to measurement of business value of IT, the focus increasingly has been on the organizational structure and the role of the CIO in realizing the value that technology provides to the organization. Recent research has indicated the diverse and occasionally multiple roles of the CIO that have evolved since its inception (Carter et al. 2011). It is the CIO who is charged with recognizing future trends in business and technology; it is the CIO who provides the leadership in realizing the value of the IS investment (Kohli and Johnson 2011) and whose role in the organization is likely to influence business performance (Banker et al. 2011). This leadership role is required within the IS function for system deployment and within the business as a whole for developing technology-enabled strategy (Chen et al. 2010).

The development and focus of the efforts of the CIO were chronicled by Hoadley and McFadden (2010), concluding with the concept that the CIO, to remain relevant, needs to become the chief information innovation officer of the organization. Early data processing managers focused on hardware and software, efficiency of processing, and minimization of downtime of the systems. In 1995 when organizations were beginning to reduce their silo structures by looking at their processes, IS and business executives were called to form partnerships to improve the success of their reengineering efforts (Martinez 1995). A blueprint for building such a partnership was presented that shifted the activities of the CIO from solely managing the IS function internally to aligning the management of IS and business strategy.

Today, the focus has shifted from technical efficiency to strategic leadership. The CIO is to guide the enterprise in its collection and dissemination of vast amounts of internal and external data in
information-rich, immediately available, and user-specific formats that lead to timely and strategic decision making. The CIO becomes the executive-level systems thinker who can communicate the value of IS in nontechnical, business-impacting terms that provide direction to the organization. The strength of IS leadership is grounded in a partnership between the IT and business functions with particular attention to strategic planning and after-action-reviews of IS implementations (Tallon 2008).

The strategic leadership role of the CIO is particularly challenging in those firms dominated by specialized mechanization and complex capital investments (Kohli and Johnson 2011). Traditionally, these organizations have used these internal structures to create barriers to entry. The downside of these structures is the limited flexibility, which is antithetical to the nimble processes that are the hallmark of the digital economy. Building operational excellence into redesigned business processes requires both a holistic view of the organization and a technical savvy raising the CIO function to strategic visibility.

The maturity of an enterprise will be modeled around an information orientation in which the effective use of information permeates the decision making at all levels (Kettinger et al. 2011). The CIO serves as a strategic partner with others in the executive suite to create a culture that exploits information management to increase competitive advantage. The leadership model (Figure 71.2) demonstrates the leadership positions that can drive the organization to an implementation of information orientation (IO) for strategic advantage. With corporate examples, the information orientation guidelines are presented to the CIO to use to assess the firm’s current position, to decide whether to assume leadership, and to select a leadership style appropriate for the firm. Once leadership is assumed, the CIO must determine how to mobilize resources to improve the organization’s effectiveness in realizing the business value of IS.

CIOs should use the specific metrics and language to communicate the value of IS within the organization (Mitra et al. 2011). The metrics are grouped into five domains that address those business categories that are important to executives. Using the guidelines provided, the CIO can lead the development of a set of metrics that are key performance indicators of IS value and use these indicators to improve the impact of IT within that enterprise. The use of these guidelines supports the use of organizational business value measurement with the communication tools to provide the feedback loop for improvement.

**FIGURE 71.2** Leadership positions in driving information orientation. (From Kettinger, W.J. et al., *MIS Q. Exec.*, 10(4), 157, 2011; Reproduced with permission from MISRC—Indiana University.)
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71.5 Future Impact on Practice

Practitioners will experience profound effects of measuring the business value of IS. What once was perceived as the productivity paradox has become a language and understanding that deploying a supportive and flexible information architecture informs users about the content and context of real-time decision making (Weiss 2011). Some organizations seek to reduce the fragmentation of their systems through the use of an integrated enterprise architecture (Bradley et al. 2011). The architecture is logically designed to link technologies and business processes for current and planned IS development thereby “informating” those processes for strategic purposes. Whether executives choose to implement such a technology/process coupling or choose to implement processes that integrate disparate systems, the interdependencies of technologies and processes require adroit management to yield high value. It is the integrative executive who will lead the most successful organizations to realize the high business value of IS investment.

71.6 Future Research

A review and synthesis of the research literature articulated a theoretical framework in which the business value of IS takes into account the context of the enterprise (Melville et al. 2004). The framework recognized that a firm, as well as its competitive and macro environments, encompasses multiple factors that contribute to and are affected by the organization’s performance. To address these factors, the authors posed multiple research questions that have shaped the framework of the business value of IS within those environments.

A consolidation of research synthesized the collection of findings that remain pertinent (Kohli and Grover 2008):

- IT does create value.
- IT creates value under certain conditions; numerous factors mediate IT and value creation.
- IT-based value manifests itself in many ways.
- IT-based value is not the same as IT-based competitive advantage.
- IT-based value can be latent.

From this baseline research, themes were developed to demonstrate the evolution of IT’s value and how it is captured, measured, and communicated (Kohli and Grover 2008):

- Theme 1: IT-based co-creation of value. How can organizations with different or new IT resources co-create value and equitably partake in the IT-based value?
- Theme 2: IT pervasiveness. How can we digitize various functional and dynamic business capabilities in order to increase business value under various conditions? Can these capabilities be replicated and sold as products?
- Theme 3: Information mindset. How can we create information capabilities that enhance and do not destroy digital business capabilities?
- Theme 4: Value expansion. What are the indirect and intangible paths to economic value that can be influenced by information and IT capabilities, and how do we foster them? Value expansion includes flexibility, agility, inter-organizational collaboration, and risk management.

The investigation of IS investment to mitigate risk as part of the value expansion theme has emerged from the application of real options theory (Tallon et al. 2002; Lankton and Luft 2008). Real options theory takes into account the ability of a decision maker to be flexible and adaptable in making IS investments. The challenge of measuring business value in a chain of investments designed to mitigate risk is that the best thing that can happen is nothing; i.e., sometimes a firm will invest in IS to reduce or eliminate the probabilities of adverse events. The hard metric becomes the estimated cost of potential failure compared to the investment to achieve no failure, reduced exposure to risk, and/or reduced cost of insurance coverage.
Though quantifiably challenging, the application of this type of IS investment is evidenced in practice, specifically in the healthcare industry to improve estimates of complication rates and to reduce malpractice insurance premiums (Menon and Kohli 2012). On the downside, there is additional evidence that the investment in IS may create legal evidence of malpractice, which could increase exposure to risk and malpractice insurance premiums (Ransbotham and Overby 2010). These alternative findings indicate that the IT itself is value neutral, but the IS investment may yield quantifiable risk and mitigation options.

As research has expanded into the areas mentioned earlier, the IT co-creation of value has warranted particular attention. A special issue of *MIS Quarterly* in 2012 presented multiple studies that focus on the particular factors that enhance the development of business value when intangible and tangible IT assets work together. A continuing question of interest is whether or not investments in IS creates measurable improvements in profitability, productivity, and consumer value (Mithas et al. 2012). Yet increasingly, studies explore how inter-organizational systems create and sustain business value for participating partners (Han et al. 2012; Rai et al. 2012; Sarker et al. 2012). The issue includes an essay (Constantinides et al. 2012) proposing that future research consider the pragmatic ends that studies can and should address as well as the decisions that are made regarding data collection, experimental design, and ultimate impact of investigations. The broader question of relevance vs. rigor remains as valid now as it was when the IS field emerged.

Future research also will expand the IS field into interdisciplinarity. Just as organizationally implemented systems expanded into inter-organizational systems and creation of business value expanded into co-creation of business value, so does the field of IS continue to expand into its close business disciplines and broader behavioral disciplines. Ethical questions remain about co-creating value for those who are separated from access to that value as the digital divide separates “have” from “have-not” and digital natives from digital immigrants. What particular value do specific emerging technologies provide? How does consumerization of IS, where the boundaries of personal and professional processes are blurred, influence our value perception of IS and IS investment? How do we create value within virtual business processes such as online diagnosis and planning tools? Is IS value creation different or the same in virtual organizations? These broader questions will require broader thinking to yield greener pastures of study. Yet this is the promise of the future that IT and IS are no longer systems for their own sakes. Instead, they are value-development tools of the business and organizational future. As the speed of technology increases, and the reach of global processes expands, so must our understanding of technical systems combined with human innovation synergistically increase the power organizations to achieve their goals.

### 71.7 Summary

The study of the business value of IS emerged as a topic of interest as IT infrastructure and personnel have become deeply embedded in business processes. Once it became clear that organizations rely on their IS investments to conduct transactions, make decisions, and monitor their environments, justification of expenditures led to the application of financial analytics to support the investments. Yet large amounts of incoming data (e.g., from social media), the pervasiveness of the technology, and IT’s central role in process enablement have exposed limitations of currently available analytical tools. Organizations continue to seek explanations and knowledge from the IS research community to identify how to assess the value of investing in IS vis-à-vis other demands and opportunities for investment. Early studies viewed narrow departmental applications as capital expenses to be amortized and depreciated. Organizational systems enabled interdepartmental processes measuring effectiveness at the firm level. Organizations have come to realize that combining the technology infrastructure with the human capabilities expanded the performance of the assets synergistically. This realization has broadened the investigation of how IS investment creates value for the business.

Currently, organizations continue to justify their expenditures in IS. However, recent innovative uses of IS indicate that the focus of the justification must be on how the organization can
use systems to enable and expand business strategy and forge strategic partnerships as a basis for competitive advantage for all the partners and for the consumers. The IS value is embedded within business processes and in inter-organizational, inter-stakeholder processes with the lines between personal and professional applications increasingly blurred. As the technology becomes inseparable from the processes, the enterprise will continue to measure and evaluate the business value of IS through novel ways that may include intangible measures for agility, collaboration, and risk mitigation.

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