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THE HIDDEN VALUE OF IT
A Review of Information Technology and the Productivity Paradox
(by Henry C. Lucas, Jr., Oxford University Press, New York, NY, 1999)

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‘ It suddenly dawned on me that I might get nothing out of this, not a penny.’
- Stephan Paternot (2001), Co-founder of the defunct theGlobe.com

Far from being a death-knell for e-business, recent dot-com failures have served to remind us that the basics of good business practices and valuation never go out of style. This holds true whether you are an investor looking to purchase stock or a manager deciding whether to fund an e-commerce technology initiative. Quantitative tools such as ROI and cost/benefit analysis are more than just a hook to hang your decision hat on. They are time-tested, proven ways to determine an investment’s value.

Or are they? Henry C. Lucas, Jr. in his book *Information Technology and the Productivity Paradox* (Oxford University Press, New York, NY, 1999), suggests that although these tools have their place, they should not be the only basis for valuing IT projects. Rather, a combination of quantitative and qualitative factors need to be assessed in order to avoid both missed opportunities and exaggerated expectations. Lucas provides a framework that managers can use to evaluate an investment’s potential for returns in both economic and non-economic terms and in the process, get their next e-business project funded.

The depth and breadth of expenditures needed for e-business IT projects have always provided a challenge for managers trying to demonstrate traditional, financially-based returns. The difficulty lies in trying to capture the benefits of an investment that is often a combination of competitive necessity, organizational transformation and new strategic direction, mixed with leading-edge technology and uncertain market conditions. For Lucas, the key to valuing these investments is in understanding this diversity. Different types of IT applications exhibit different types of returns. Specifically, Lucas states that there are IT applications, which warrant investment, for where you cannot expect to obtain a measurable financial return. He identifies eight types of technology investments and suggests that each type has its own probability of return. Not surprisingly, many of today's more popular e-business applications are a blend of investments that have no predictable financial return. Table 1 presents Lucas' investment categories and probabilities of return, along with several e-business-related examples.

[Insert Table 1 Here]

While you may not agree with the exact figures Lucas assigns to the likelihood of returns, the point is that different types of investments warrant different expectations.

Recognizing the type of investment proposed and its potential for financial return is the first step in successfully funding e-business initiatives. In a survey of e-business IT funding practices at thirty companies in the U.S. and Europe, Ross and Beath (2002) found that the majority of the companies said they traditionally relied on a financials-based business case to justify investments. However twenty-seven of the firms funded at least one e-business initiative without a business case. Aiding the funding decision in several firms was an approach based on investment types, similar to Lucas' categories, where separate budgets

were established for different kinds of investments. Twelve of the firms had even created a separate budget for what they considered to be experimental e-business projects. Ross and Beath note that by classifying investments and allocating funds by investment type, companies reduce the potential for under-funding any specific type of project and reverting to the old ROI-or-nothing business case.

Yet if so many of these projects have no predictable financial return, why are companies still investing in them? Lucas' answer is that since IT is such an integral part of business, it often exhibits value that has only a remote connection with money. In a market-based economy, prices are established and value is typically measured in dollar terms. However, computing a monetary value for a return from IT investments can be challenging. Lucas' stance is particularly true for firms competing in today's electronic marketplace, where the value of speed and improved information are especially difficult to quantify.

For GE Plastics, the retooling of GEPlastics.com was less about increasing its \$2-3 million per week sales revenue and more about protecting the way it does business (Levinson, 2000). With plastics aggregators beginning to come online, the company realized that increasing customer loyalty and differentiating itself from competitors would be key to ongoing success. Although the firm's online design center does not directly generate sales, the site offers new functionality to existing customers and exposes thousands more potential customers to the benefits of doing business with the firm. GE Plastics' insight illustrates how managers looking to fund e-business initiatives must consider all the ways that an IT investment can contribute to success, regardless of whether that contribution is direct, indirect or even unanticipated.

An early example of unanticipated benefits is the airline industry's investment in travel agency automation, which Lucas notes created not only direct benefits from booking fees, but also indirect benefits through biased markets and improved customer service. Since

that initial application, the airlines' use of electronic channels has exploded to include direct customer electronic sales and on-line check-in. In addition to boosting service to another level, the individualized customer information these new channels provide can form the basis for future price and market discrimination. Shapiro and Varian (1999) also remark on the difficulty of determining future benefits, particularly those derived from e-business technologies that exhibit positive network externalities. They note that network effects in these technologies tend to manifest long lead times that are often later followed by explosive growth. Much of today's continued investment in wireless technologies, such as Wireless Application Protocol (WAP) and Bluetooth, is based on the belief that exponential growth for those applications is just around the corner.

Equally difficult to quantify, according to Lucas, are the benefits derived from IT investments that are an integral part of company strategy. Such close coupling makes it difficult to measure the exact contribution of IT in financial terms, but value can often be measured qualitatively. Lucas notes that IT is a key component of Federal Express' corporate strategy to compete in the new electronically enabled marketplace. Spending \$1 billion a year on items including a website where customers can track packages, FedEx has used IT to transform itself into a package and information delivery business. Lucas's position is also supported in a recent interview of Rob Koch, Vice President of Finance at OfficeDepot. Remarking on the company's decision to implement a full-blown B2C retail website in 1997, Koch stated: 'ROI's a good tool, but it's not the be-all and end-all. Some decisions are purely strategic' (Berkman, 2001, p. 96). By the year 2000, the site was generating 9% of OfficeDepot's total annual revenue, in a sector where many firms are still hesitating to make a commitment.

Lucas also points out that major changes in organizational structure can often be attributed to IT. Interorganizational systems are redefining the concept of what constitutes a

firm by enabling what Lucas terms “virtual components,” traditional parts of companies that no longer exist physically. Chrysler’s virtual inventory, enabled by just-in-time ordering and delivery, is one example of this type of component. Riggins (1999) has reported that Security First Network Bank, the first all-Internet bank, operated for several months without any physical branch office. Electronic business channels are also enabling closer integration of steps in the value-added chain (Malone, Yates and Benjamin, 1987), at times almost erasing the boundaries between firms. In a survey of 120 CEOs of e-commerce firms, Kickul and Gundry (2001) found that the enterprises studied had formed innovative, fluid external relationships with suppliers, customers and even competitors. One CEO in the study remarked (p. 357): ‘We have no competition, just resources we haven’t used yet!’ Such comments are not just mere bravado. Today’s successful e-business firms are busy transforming themselves from click-and-mortar to mortar-and-borderless.

Lucas argues that cases such as the ones above demonstrate strong qualitative evidence that there is payoff from IT investments, even though the quantitative returns remain difficult to calculate. Although these successes cannot be totally attributed to IT, the business strategies undertaken could not have existed without the supporting technology. Where would eBay be without the Internet and e-commerce software? Would Sam Walton be a household name today without the market-altering ability to electronically integrate suppliers? Despite the recent downturn in economic activity, including e-commerce, it is certain that technology will continue to transform the landscape in which we do business and the ways in which we add value to our firms for many years to come.

Of course there are times when the value of an IT investment can be measured quantitatively and certainly qualitative value does not preclude monetary returns. For these situations, Lucas provides several techniques for capital budgeting analysis, including an approach based on options pricing models. The options pricing method of valuation is

especially well-suited to e-business initiatives, since they are typically implemented in phases or as separate, yet dependent projects. For example, a firm may need to evaluate both a current e-commerce infrastructure initiative and a future B2C website project that relies on that infrastructure. Options pricing models explicitly address the opportunity costs and benefits associated with this type of coupled investment. The options framework is also useful for assessing when, in the future, to invest in a technology. Investment in still-evolving technologies, such as Web services and peer-to-peer e-commerce applications, are potential candidates for this type of forward-looking valuation.

In all, Lucas makes a persuasive argument that there is value in information technology, both in economic and non-economic terms. While some managers may already be familiar with the concepts presented, Lucas combines them into an overall assessment framework and offers insights into the more subtle sources of IT worth. With most of the e-commerce market still in its infancy, estimating the direct financial return on any technology investment is problematic at best. Thus the future of many electronic market technology initiatives will continue to rely on the insight and vision of managers who are aware of the hidden value of IT.

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Table 1 – IT Investment Types and Probabilities of Return

Type of Investment	Probability of Return	E-Commerce Examples
Infrastructure	0.2 to 1.0	Wide area networks; firewalls and other security; XML conversions
Required managerial control	0 to 0.5	EDI mandated by supplying or purchasing firm; regulated electronic reporting
No other way to do the job	0.5 to 1.0	Mass e-mail marketing; concurrent sale and delivery of electronic goods
Direct return from IT	0.7 to 1.0	Just-in-time inventory systems; on-line transaction processing
Indirect return	0 to 1.0	Airline reservation/check-in and other self-service websites
Competitive necessity	0 to 1.0	Bank ATMs; some websites such as BN.com, Borders.com
Strategic application	0 to 1.0	Dependent upon the firm, e.g., Schwab's e-trading and Wal-mart's B2B systems
Transformational IT	0 to 1.0	Virtual organizations; mortar-and-borderless firms